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Connecticut Agricultural Experiment Station
New Haven, Connecticut

A HISTORY

of

CONNECTICUT AGRICULTURE

by

E. H. JENKINS
Director Emeritus

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THIS paper is rather a sketch of the course of Connecticut agriculture than a complete history of it. A history should cover the economic, political and social relations which went with and greatly affected its practice and its prosperity. But such a history would of itself be a volume and not, like this, a single paper among many others relating to the State.

However, great the temptation to discuss the broader aspects mentioned, it has been necessary therefore to confine the work simply to the story of the development of the art of farming, with only the barest reference to the economic and political conditions of its environment.

To set forth the effect on agriculture of the expansion of manufacturing, the embargo and non-intercourse acts, the opening of the west, the development of transportation and the six wars cannot be discussed here.

Yet they all deeply affected the course of agriculture. They were like the buffetings of heavy waves, with agriculture now on the peak and then in the trough of the sea, constantly conning the helm and trimming its sails to avoid shipwreck. Of course this experience is not peculiar to farming; all kinds of business are affected in the same way. But these great disturbances bore with a special severity on the farmer because of his inexperience in transacting business. For more than a century and a half farming was not a commercial business, but a domestic affair of each house-holder, chiefly confined to providing food and clothing for his own family.

Business acumen and the methods of trading have to be learned by long experience and they are a comparatively recent acquisition of the farmer.

It is not so long since the three courses open to young men were "the professions, business and farming." At present farming should really be a profession and a business in order to be a fairly successful "calling."

Aboriginal Agriculture

No writing or legend gives the history of agriculture in New England before the coming of tthe white man. But on a somewhat extensive scale a simple kind of agriculture was certainly practiced by the Indian dwellers here long before the seventeenth century.

Almost its only relics are the few crops which they raised, of which maize was their staple and their priceless bequest to their successors, a crop which they cultivated extensively and stored for winter use.

This stored corn was all that stood between the first settlers and great scarcity of food if not of actual starvation and in the earlier days of the settlement was occasionally bought of the Indians to relieve a time of scarcity.

It has been one our staple crops from Colonial days to the present and is now grown in larger quantity in the United States than any other.

Maize or Indian corn had its origin in America but has been changed by "domestication" so that it bears no close resemblance to any native species now known and has been developed out of all fitness to survive in a wild state. This was probably a work of centuries by people who have left no other record of this work in plant breeding than the domesticated plants which they have handed down to us.

It is a development for which we are indebted probably to some ancient civilization in Central or South America,

a development vastly more valuable than any of those of a modern "plant wizard."

Of particular interest is the Maya civilization developed in Yucatan, of which the earliest established date is 113 B. C., and the time of greatest development from 455-597 A. D. The Mayas reached a high state of culture as is shown by their monuments and inscriptions which have lately been studied and partly deciphered.

They planted corn, beans and pumpkins, taking advantage of the wet and dry seasons to harvest two crops annually. Among their records are pictures of the maize-god, planting corn, represented frequently as a youth with a leafy headdress, possibly meant to represent an opening ear of corn. This deity appears to be at the mercy of the evil deities when not protected by the good (59, p. 94). Other pictures show attacks by worms and birds, suggesting that the pests are as old as the plant. The zodiac sign, Virgo, the Virgin, is represented in Peruvian, Mexican and Maya sculpture as the Maize Mother.

Roger Williams (10) writes of the Indian tradition as to the source from which corn and beans came, "These birds," crows, "although they doe the corne some hurt, yet scarce one native amongst an hundred wil kil them, because they have a tradition, that the Crow brought them at first an Indian Graine of Corne in one Eare and an Indian or French Beane in another, from the great god Cantantowit's field in the Southwest from whence they hold came all their Corne and Beans." The last clause of this tradition is probably correct.

Our flint, dent and sweet (45) types, the very early and the tall, later maturing sorts of corn were probably all grown by the aborigines before the settlement by white men. In pre-Columbian days one or more varieties were

grown all the way from the St. Lawrence on the north to the Rio de la Plata on the south.

Pumpkins, squashes, beans and peas were also grown by the Indians, all but the last probably indigenous to this country.

"Peas" were grown by the Indians, according to the annalists, but the Canada pea and the field pea are old world plants. Possibly a Lathyrus, vetchling, or some small rounded bean is what is referred to.

Before the coming of the white man there was a plenty of land in Connecticut well enough cleared for growing what crops were needed. Besides using the tidal marshes and the alluvial lowlands, the aborigines had also long practiced burning portions of the woodland to make easier the taking of wild game, deer and turkeys. This cleared the forest of underbrush and young trees. Larger trees, (33) were girdled by the Indians to make open spaces where their crops could be planted, leaving them ready for further improvement (24, Vol. I).

The Narragansetts' land in Rhode Island was cleared of wood for eight or ten miles from the seashore and planted to corn (76. Vol. I).

There is abundant evidence of large clearings elsewhere.

Says Roger Williams, (10) "When a field is to be broken up, they have a very loving, sociable, speedy way to despatch it; all the neighbors, men and women, forty, fifty, a hundred, etc. joyne, and come in to help freely." The field was not wholly tilled but corn was planted in hills 12 to 20 inches in diameter and the soil of these hills was all that was cultivated. The hills were used over and over in successive years and they have persisted in some places until recent times. (10). Near the sea, at

least, fish, (menhaden) were exclusively used as a fertilizer.

The implements of the Indians were very crude. Iron was unknown. Stone hoes and perhaps spades have been found. Bones, shells and wood were also used; yet it is said of their cultivation (78), "Wherein they exceede our English husbandmen, keeping it so cleare with their Clamme-shell hoes as if it were a garden rather than a Cornefield, not suffering a choaking Weede to advance his audacious Head above their infant Corne, or an undermining Worme to spoile his Spurnes."

They also used a hoe made of the shoulder blade of a deer or a tortoise-shell, sharpened upon a stone and fastened to a stick.

"Their corne being ripe, they gather it, and, drying it hard in the sunne conveigh it to their barnes, which be great holes digged in the ground in form of a brasse pot, seeled with rinds of trees, wherein they put their corne, covering it from the inquisitive search of their gormandizing husbands, who would eate up both their allowed portion, and reserved Seede if they knew where to find it." (78).

Connected with aboriginal agriculture should be mentioned two important plants which were not cultivated but were used extensively. The first is a food plant to which writers refer as "rice," "Indian rice," or "Canada rice," *Zizania aquatica,* a grass which grows commonly along the banks of streams and marshes and in shallow water. It was easily gathered in the early fall and is palatable and nutritious. It is still gathered and used in the stuffing of game birds and is esteemed a luxury.

The other plant yielding a textile fiber, was the Indian hemp, *Apocynum cannabinum,* which grew commonly in

this State. From the fiber of this plant the women twisted twine or rope and made, among other things, fish nets, sometimes twenty or thirty feet long (69. Vol. I).

Oldham, in a trading trip to Connecticut in 1633, found that the Indian hemp grew spontaneously in the meadows in great abundance. "He purchased a quantity of it," it appeared to him "much to exceed the hemp grown in England." Later writers, however, pronounced it inferior to the other.

Roger Williams says, "the Indians all take tobacco, and it is commonly the only plant which the men labor in, the women managing all the rest." This was probably *Nicotiana rustica,* a smaller plant and inferior to our cultivated species. It is stated that it was grown in Canada as early as 1535. Flags and rushes and certain vegetable dyes were used for making baskets. Carrier asserts (9), that "a comparison, crop by crop, taking into consideration acreage and value of these products with all other crops now grown in the United States shows quite clearly that our agriculture is about one-third American." The agriculture of the Indians was chiefly if not wholly managed by the women. Stiles says, (61), that a common exhortation at marriage was in substance, "You, man, must take good Care to hunt deer and fish and provide Meat for your Squaw. You, Squaw, must take care to plant and hoe Corn and bring wood and cook Victuals for your Sannup."

The Indian men are generally regarded as lazy, shiftless and improvident in their family life, allowing or forcing their women, who were reckoned to be inferior beings, to do all the drudgery. No doubt there is much of truth in this. Laziness, incompetence and contempt of women did

not mark the aborigines as absolutely different from many of their successors in this State.

This judgment on Indian men must be tempered by the following facts:

The woman owned all the household property of the family, including the tools used in farming, cooking, dressing skins and making fabrics and in many tribes food, skins and individual dwellings or wigwams.

Indian descent was generally through the female line. Children belonged to the mother's, not the father's totem. In some cases a female sub-chief sold land to the settlers, but this, an international affair, was usually conducted by the male chief.[1]

The man had to be always ready to join in a foray against his neighbors of another tribe, or to repel a foray from them. He was at all times and of necessity a warrior. Hunting and fishing required skill and strength. Thus women were the property holders of the family groups. Men represented the army, legislature and courts and did such provisioning of the family as required capture and killing. All their work required at times protracted labor, exposure and hunger and when the search for food and the defense of the property and life allowed, they may have been, in the language of Kipling, "most 'scrutiating idle." When about his regular work the Indian was alert, crafty and superstitious with occasional streaks of loyalty and honor — and a reveller in all the arts of hideous cruelty.

[1]In the allotment of land in severalty to the Indians in modern times one grievance was found to be that it was allotted to the man and not to his wife, contrary to their idea of what was proper.

Agriculture in the Seventeenth Century

The aboriginal agriculture was the root on which the Colonial agriculture was grafted. No attempt will be made to recite the events of the colonization farther than to note those which have a very direct bearing on agricultural development.

It is important to consider the physical surroundings of the first traders and immigrants who began coming to Connecticut in 1631.

The country is described as a wilderness. Its topographical features were not very different from what obtains today. It was, of course, much more thickly wooded than now and abounded in heavy timber.[2]

There were of course no roads but only Indian trails and the first settlers from Massachusetts had perhaps to hew their way for a part of the journey.

The territory was not, however, wholly a forest, but abounded as we have seen in open, roughly cleared tracts, suitable for cultivation and capable of increased production with the use of iron implements, axes, hoes and spades which the colonists brought with them.

The whole area was occupied or claimed by various tribes of Indians who numbered, according to Trumbull's estimate, not less than twelve or fifteen thousand and possibly twenty thousand (69. Vol. I). But DeForest (23a), considers this much too high an estimate and holds that 1,200 warriors and 6,000 or 7,000 individuals is a liberal allowance for the aboriginal population.

They were more numerous in Connecticut, in propor-

[2] (31) "The pine tree challengeth the next place and that sort which is called the Board pine is the principal; it is a stately, large tree, very tall, and sometimes two or three fadoms about; of the body the English make large Canows of 20 foot long, and two feet and a half over, hollowing them out with an adds and shaping the outside out like a boat."

tion to area, than elsewhere in New England, for the land was rich in game, the waters rich in fish and the soil, in parts, very fertile.

These Indians chiefly belonged to the Algonquin family while over the border in New York was the Iroquois family, or the "Six Nations."

These families were divided into a considerable number of tribes.

Thus the west shores of Narraganset Bay were peopled by the Narragansetts, numerous and warlike, who held in partial subjection the weaker Nyantics near Point Judith. The fair dealing and tact of Roger Williams did much to restrain the hostility of the Narragansetts to the settlers. To the west of these and about the Thames River were the still more formidable Pequots who for fierceness and bravery were preëminent in southern New England. Westward, in the lower Connecticut valley, were the Monhegans, a small but valiant tribe held tributary to the Pequots and restive under it. There were also numerous lesser tribes within the present boundaries of this State, Nehantics, Quinnipiacs, Tunxis, Podunks and others. The thickly wooded mountain ranges between Connecticut and the Hudson had few inhabitants. But beyond, in New York, were the fierce Mohawks, dreaded by all the others, to whom the Mohegans paid yearly blackmail to avoid plunder and murder as far as possible (26).

Down to about the time of the first settlement of Connecticut the New England settlers had experienced no great trouble with the Indians.

They were at first disposed to be friendly but as the settlements began to be pushed further inland and some of their best clearings to be occupied by the invaders, even

though the land had been fairly bought of the tribal chiefs, hostility increased and soon resulted in actual war.

Of predatory wild beasts, bears, wolves, panthers, lynxes and foxes were very common and, as will be seen later, were very destructive to the livestock and crops of the settlers for more than a century.

Into this country adventurers came from Massachusetts in 1633 and halted at Windsor. This was a trading expedition and made no permanent settlement. In 1635 about sixty men, women and children with their cows, horses and swine came overland from Plymouth and Massachusetts Colonies to the region of Hartford, starting on October 15th. They were unable to build dwellings before winter, their goods which were sent by sea were lost and most of them made their way back to Boston.

A very few remained (10). But in 1636 Wethersfield, Windsor and Hartford were settled by colonists from Massachusetts.

The Newton (Cambridge) congregation, (38) through their minister, Rev. Thomas Hooker, urged from the authorities permission to migrate.

The reasons given were, the crowded state of their lands which prevented their friends in England from joining them,[3] the fertility of the Connecticut soil as reported by Oldham and the fact that settlement would shut out the Dutch who were trying to establish a claim to Connecticut. "The minds of this people were strongly inclined to plant themselves there."

Hooker wisely did not mention in his petition that there was considerable discontent also with the narrowness and

[3] Cotton Mather, (65. p. 17), in referring to the migration from Massachusetts, said: "Massachusetts soon became like a hive overstocked with bees, and many thought of swarming into other plantations."

strictness of the Winthrop-Cotton administration in Massachusetts.

Permission was rather grudgingly given and a migration followed, apparently in three companies. One, of one hundred persons, mainly from Dorchester, Mass., journeyed overland in fourteen days and settled in Windsor. The second company, mainly from Watertown, Mass., probably went from Boston by water to Wethersfield. The third made their way overland with 160 head of cattle "and fed of their milk on the way," and settled in Hartford. "Women and children took part in this pleasant summer journey which lasted about two weeks." Mrs. Hooker, being ill was carried in a horse litter (26). In the following year 800 people were living in these towns (or settlements), forming the Colony of Connecticut.

In 1638 the town of New Haven was founded under the leadership of Davenport and Eaton, which soon became the republic of New Haven, including Milford and Stamford, to which Southold on Long Island and Branford were afterwards added (26). Prior to 1640 there were at least nine settlements made, four on the Connecticut River and five others on the shore of Long Island Sound. In the next decade five others were made on the Sound shore and one inland. Between 1650 and 1685 eleven new settlements were made, three on the Connecticut River, one on the seashore and seven not on navigable waters. From 1685 to 1700 eight settlements were made along the eastern side of the State as far north as Windham and two other inland settlements. The harbors of New London, Saybrook, New Haven, Stratford, Bridgeport, Norwalk and Greenwich were all occupied.

Thus, in the seventeenth century at least thirty-eight settlements were made in Connecticut, eighteen on navi-

gable waters and twenty inland. Three of the thirty-eight, however, were "set off" from previous settlements. By 1660 practically all the shore from the Connecticut River to the New York boundary was settled, most of the Connecticut River border as far north as Windsor and an area from New London north above Plainfield. By 1675 these boundaries were considerably expanded but shrank again somewhat, following King Philip's war and expanded rapidly afterwards. In Lois Matthews', "The Expansion of New England," (38), this is very clearly illustrated by maps. By about 1732 practically the whole State was included in settlements or districts claimed by the several communities.

Dwight, (24, Vol. I) says that "exclusively of the country of the Pequots,[4] the inhabitants of Connecticut bought, unless I am deceived, every inch of land contained within that colony, of its native proprietors." The same thing was stated by Governor Winslow in 1676 regarding Massachusetts settlements in his report to the English Committee on Trade and Plantations (26).

This sale and transfer of lands from the Indian chiefs was effected by deeds duly signed and witnessed. Thus in 1638 Quinnipiac, now New Haven, was bought of the chief Momauguin, subject to certain rights of hunting, for one dozen coats, the same number of hoes, hatchets and porringers, two dozen knives and four cases of French knives and scissors.

A little later more land was bought for thirteen English coats (30, Vol. I). The colonists thus obtained a tract more than ten miles wide from north to south and thirteen long from east to west, since divided into Branford, East

[4] The Pequots were nearly exterminated in the Pequot war in 1637.

and North Haven, Woodbridge, Wallingford and Cheshire.

It has been said that the prices paid, always in commodities, were ridiculously small. Ridiculously small the price appears now but the bargain was the free act of the chiefs who, we may believe, considered that some warm clothing and useful tools were worth more to them at the moment than 130 square miles of wilderness in which they still retained some rights.

Part of the later trouble with the Indians probably arose from their misunderstanding of the nature of a deed. In general they may have regarded it as conferring only the right to live, hunt and fish in common with themselves, not as in any way the extinction of their own former rights.

Earlier a fort had been built at Saybrook, for defense against the Dutch, and a grant of lands made under the Warwick patent of 1631.

This was bought by the colony in 1644 from Fenwick, agent of the proprietors.[5]

The Connecticut colonists, almost wholly English, consisted chiefly of squires and yeomen, united rather closely in thought and purpose. There were a few indented servants or "redemptioners" paying for their voyage to America by service, who in time became independent citizens and a few slaves employed almost wholly in domestic service (26).

But it was a community holding substantially the same

[5] The seal of the colony and later of the state, was probably given to it, perhaps at that time, by Fenwick. Originally it represented a vineyard of fifteen vines and above them a hand, issuing from clouds, holding a label with the motto, "*Sustinet qui transtulit.*" To carry out the idea of the vineyard we may translate, without doing more violence to *transtulit* than was done by Columella and Varro. "He who has transplanted maintains."

This seal has since been variously modified, as described in the Report of the State Librarian, for 1912.

religious dogmas, the same political principles and a common heritage.

The desire for religious and political freedom was the chief motive which drove the first Pilgrims and Puritans across the Atlantic, but probably the greater number who followed them saw in the vast unoccupied lands of the new world a chance to make a living unhindered by the turmoils of Europe, and the settlers of Connecticut, as we have seen, urged as a reason for their migration the need of room for further expansion.

The settlers in Connecticut, as in New England generally, with the exception of New Hampshire, unlike those in colonies further south, were owners in fee simple of the lands they occupied.

Community of tillage, to meet their most pressing want of food, had been tried in the mother colony but had been found less effective than private managment of personally owned land.

Individual holdings were at once set off, and for a good while there was much undivided common land used by all the proprietors for pasturage, timber, etc., but there were frequent difficulties connected with this ownership in common which are witnessed by frequent acts of the General Court. Thus very early it was ordered by the towns of Wethersfield, Hartford and Windsor that five able and discreet men from each town should "take the common lands belonging to each of the several towns into serious and sadd consideration and after a thorough digestion of their own thoughts, set down under their own hands in what way the said lands may, in their judgments, be best improved for the common good."

The boundaries of the individual allotments were not very difficult to determine, but those of the separate settle-

ments and towns and of the colony it was impossible to fix accurately for many years. (The exact boundary line between a portion of Rhode Island and Connecticut was first finally determined under Governor Baldwin's administration, 1911-1915).

Dwight, (24, Vol. II, 498) describes the settlement of a dispute regarding land claimed by both New London and Lyme in 1664. The distance, danger and expense attending an appeal to the seat of government, decided the disputants to settle the matter by a combat between two champions selected by each of them. "On a day mutually appointed, the champions appeared in the field; and fought with their fists, till victory declared in favor of each of the Lyme combatants. Lyme then took possession of the controverted tract and has held it undisputed to the present day."

It appears that either this dispute was not finally settled by this trial by combat, or that some new boundary dispute arose, for about the year 1671 there was a "riot" between about thirty New London men who went to Black Point to mow grass for their minister and a party from Lyme who had come on a similar errand.[6]

There was a conflict of tongues, rakes, scythes, clubs and fisticuffs; the voice of the constable was heard in the land—and disregarded. No one was killed though some were bruised. Peacemakers finally prevailed and it was agreed to leave the matter to the courts. "So drinking a dram together with some seeming friendship, every man departed to his home." But both parties were indicted for assault, violence and riotous practices. As it was difficult to get an impartial jury in that neighborhood the accused

[6] This land, 325 acres, had been sequestered in 1671 to the use of the ministry forever (11). In 1668 the same land had been reserved by Lyme for the support of their minister.

were tried in Hartford. Both parties were fined and the fines subsequently remitted.

Regarding the civil government in the colonies; The New Haven Colony was extremely theocratic in its character. Only church members had the franchise and this in New Haven itself excluded one-half of the inhabitants from a share in the government. Each town was governed by seven ecclesiastics, known as "Pillars of the Church." They served as judges without juries because no authority for trial by jury was found in the laws of Moses.

The Connecticut Colony was much less strict in its views of civil government. In the first year it was governed by Massachusetts, but immediately thereafter a General Court was held in Hartford, May 31, 1638, and on May 14, 1639, all the freemen of the towns met in Hartford and adopted a written constitution. "It was the first written constitution known to history, that created a government and it marked the beginnings of American democracy." It made no reference to the king of England or any other government. Under it all rights and powers not expressly given to the General Court were reserved to the towns. It did not prescribe church membership as a condition for the right of suffrage.[7]

In 1643 the four Colonies of Massachusetts, Plymouth, Connecticut and New Haven formed a league, "The United Colonies of New England," including thirty-nine towns with 24,000 inhabitants. The League was given entire control of dealings with the Indians and with foreign powers and the administration was committed to

[7] "The remarkable document, though deserving all the encomiums passed upon it, was not a constitution in any modern sense of the word and established nothing fundamentally new, because the form of government it outlined differed only in certain particulars from that of Massachusetts and Plymouth." "Later courts never hesitated to change the articles without referring the changes to the planters." (3)

eight Federal Commissioners, two from each colony, all to be church members. No permission was asked from the home government. In 1661 a charter was granted by Charles I to New Haven, but by it the colony was annexed to its stronger neighbor, Connecticut, thus reducing the number of the United Colonies to three.

The League continued till 1684 when the Massachusetts charter was revoked by Charles II. In 1687 Charles also revoked the Connecticut charter, but it was never surrendered, and as the order for the surrender of the charter was never enrolled it remained in force and Connecticut was governed under it until 1818.

Concerning the relations with the mother country, we see that the first settlements were made in the reign of Charles I who, on the whole, was rather glad to get rid of a lot of religious cranks and radicals moved to a wilderness across an ocean and three thousand miles from England where they could praise God and fight savages after their own fashion. He was willing to give them charters and then to be rid of them while he reigned without a parliament from 1649 to 1660.

Then followed the Commonwealth and the Protectorate when little thought could be given to

> " * * * that small colony
> Of pinched fanatics, who would rather choose
> Freedom to clip an inch more from their hair,
> Than the great chance of setting England free."

This was a period of prosperity and undisturbed growth. But soon after the accession of Charles II the seeds of disaffection were sown which resulted in the revolution about a century later.

The story of the protection of the regicides in New

Haven and elsewhere, of religious differences, of the work of Andross and Randolph, the attempted annulment of the charter, etc., need not be repeated here.

"The four years from 1684 to 1688 were the darkest years in the history of New England." (Fiske). The advent of King William and Queen Mary in 1689 closed the long struggle with the Stuarts and lessened the tension between the Colonies and the mother country.

Such, in very brief outline, was the physical and political environment of Colonial agriculture in this Colony in the seventeenth century. Before it was settled the land was a wilderness except where it had been partially cleared and subdued by the crude methods of the Indians. The colonists' farming tools were no "better than had the farmers of Julius Caesar's day; in fact, the Roman ploughs were probably superior to those in general use in America eighteen centuries later."

"The mass of production shows no radical difference from that in ages long past." (2) "The Saxon farmer of the eighth century enjoyed most of the comforts known to Saxon farmers of the eighteenth."

But the spiritual comfort, the freedom from vassalage and other forms of tyranny and the joy of self-government made the Connecticut colonist a totally different being from the eighth century peasant.

Nevertheless the earlier years were a fierce struggle against starvation and murderous attack, demanding almost continual manual labor from all members of the community, men, women and children alike.

It is not possible now to give any very precise picture of the every day life of the early settlers or of the course of their agriculture.

"There is but a slender residue from the vicissitudes

of history to throw any sufficient light upon some of the habits, practices and daily concerns of the colonists in the ordinary routine of their existence."

The first care of the settlers was naturally a provision for continuous food supply after the store of provisions which they brought from Massachusetts was exhausted. Wheat,[8] rye and pease had been grown in the Massachusetts and Plymouth Colonies, but the main reliance at first was Indian corn. The reasons are obvious. They had abundance of seed, they knew from the Indian experience that it yielded well and the method of planting and cultivating had been learned from the Indians by the settlers at Plymouth, "being instructed in the manner thereof by the forenamed Squanto."[9]

As to the method of planting corn, Peters, writing in 1781 says, "Maize is planted in hillocks three feet apart, five kernels and two pumpkin seeds in a hillock and between the hills are planted ten beans in a hillock. One man plants one acre a day, in three days he hoes the same three times and six days more suffice for plowing and gathering the crop. The whole expense is thirty shillings and allowing ten shillings for use of land, the whole expense is two pounds, while corn is worth two shillings per bushel." He figures that the gain is seldom less than 300 and often 600 per cent. "It is thus that the poor man becomes rich in a few years," — and it is thus that a parson figures profits for the farmer. But this description of the way of planting corn, though written in the following

[8] In the third generation of farmers wheat had almost passed out of cultivation and was got chiefly from New York and the southern plantations.

[9] Squanto, an Indian who had been carried to England, it is said, by Waymouth, learned the English language and was afterwards returned to his native home, Plymouth. He "proved a special instrument of God for their good, beyond expectation; he directed them in planting their corn, where to take their fish and to procure their commodities." (42)

century and by one to whom Ananias and Munchausen were mere tyros, is substantially correct judging by other accounts and was probably followed from the beginning; being adopted from the Indian practice. It is noted in the old rhyme:

One for the bug,
One for the crow,
One to rot,
And two to grow.

At first fish was the only fertilizer. Three or four fish, (menhaden), were put in a hill "and in them they plant their maize which grows as luxuriantly therein as though it were the best manure in the world; and if they do not lay fish therein the maize will not grow, so that such is the nature of the soil." (42)

The colonists brought seed of other cultivated crops with them for in 1638 among the supplies requisitioned for the force engaged in the Pequot war are mentioned corn, oats, pease and rice, see page — (63, Vol. I).

The colonists, while they were at first chiefly dependent on Indian corn, wanted wheat to which they were more accustomed and in 1640 (9) it was ordered, to promote the production of English grain, that every farmer for every team he owned could have one hundred acres of plow land and twenty of meadow if he seeded twenty acres the first year, eighty the second and the whole one hundred the third.

Of the gardens of the early settlers in New England almost the only account is that of John Josselyn in 1672. (32). (Wood, 78). These accounts do not specifically refer to Connecticut but probably conditions were quite alike in all the New England Colonies.

"Of such garden Herbs, (amongst us) as do thrive

there, Cabbage, Lettice, Carrats, Parsnips of a prodigious size, Red Beetes, Radishes, Turnips, Wheat,[10] Barley,[11] Oats, Pease of all sorts and the best in the world, and Beans. In the gardens Josslyn also finds Sorrel, Parsley, Marygold, French Mallowes, Burnet, Winter and Summer Savory, Time, Sage, and—Purslain, (May Allah blot it out). Red and black currants were grown and gooseberries "grow all over the countrie" (31). Coriander, Dill, "annis," "sparagus," Pepper wort, "Tansie," cucumbers and melons also grew.

Obviously the settlers very quickly provided themselves with a variety of vegetable foods and with "English roses very pleasantly."

There was also an abundance of fruit; plums, wild cherries and various berries growing everywhere. Carrier, (10), quotes Roger Williams, "In some parts where the natives have planted, I have many times seen as many (strawberries) as would fill a good ship within a few miles compasse: the Indians bruise them in a mortar and mix them with meale and make a strawberry bread."

Josselyn, in 1638-1639, found no apple or pear trees anywhere except on Governor's Island in Boston harbor where he got "half a score of very fair pippins." But on his second voyage, thirty years later, he says that the finest trees prosper abundantly, apple, quince, cherry, plum and barberry and "the country is replenished with fair and large orchards."

Perhaps the most particular account is that of the orchard of Henry Wolcott in Windsor. This was in bearing

[10] Both winter and summer wheat were grown, the former accepted for taxes at five shillings, the latter at four shillings per bushel, with corn at two shillings six pence.

[11] As early as 1646 barley was grown in Wethersfield, probably chiefly used for making malt for beer, an article of general consumption. (64)

before 1649. Summer Pippin, Holland Pippin, Pearmain, "Belly Bonds" (Belle et Bonne), and London Pippin are varieties named. He also sold orchard trees, both apple and pear, as early as 1650. (65). The price of apples fell in Windsor from eight shillings the bushel in 1650 to two shillings sixpence to three shillings in 1654.

Josselyn was told by Wolcott that he made five hundred hogsheads of "syder" from his own orchard in one year, sold for ten shillings per hogshead, and that in 1654 he got 1,588 bushels of apples from his own orchard. Cider, beer and other spirituous liquors were drunk in large quantities in the Colony. Cider and beer were the common table beverages. Tea and coffee were very rarely to be had before 1700 if at all.

"It has been truly said that fruit growing in America had its beginning and for almost two hundred years its whole sustenance in the demand for strong drink."

"As early as 1643 there was a weekly market in Hartford and many towns established fairs or markets held once or twice a year for the sale or barter of all kinds of commodities.

The houses of the early settlers, according to Hollister, (30), were of wood and those of the more prosperous, after the first thirty years, were framed. The frames were of heavy oak timbers, some of them eighteen inches in diameter. The rafters were larger than the sills or beams of present day houses and supported slit sticks, called "ribs," to which were fastened long, reft, cedar shingles. The siding was of oak clapboards, reft and smoothed. Only the sides of the rooms were plastered. The floors were of oak. The windows were of two small leaden frames with diamond-shaped panes and hinges opening outwards. The outer doors were of double oaken

planks, made as solid as a single piece by nails or spikes driven into them in the angles of diamonds. The rooms were seldom over seven feet high, with enormous fire places and a stone chimney. The buildings "are generally of wood, some of stone or brick, many of good strength and comelynesse, for a wilderness." (15, III. 1680).

Time was reckoned by farmers according to the working seasons as well as by the calendar. Events happened at "sweet corn time," "at the beginning of hog time," "since Indian harvest," etc. (3)

The need of textiles was early felt. In 1640, (15, pp. 61, 64, 79), every family was required to get and plant at least one spoonful of English hemp seed in good soil, at least a foot between each seed "and tend it in husbandly manner." The next year each family that kept a team was to sow one rood of hemp or flax. Every family which keeps cows, heifers or steers was to sow twenty perches. Every family with no cattle shall sow ten perches and tend it properly and every family was to provide at least half a pound of hemp or flax.

In 1675 (15), to encourage the production of rape oil, the monopoly of its manufacture was given to William Roswell for ten years.

The Court gave a subsidy of two shillings per acre per annum to each person sowing cole seed up to eighty acres. This was to continue for ten years. Tobacco was grown prior to 1640 and in that year an act forbade the "drinking of tobacco." Later a statute restricted its use to that grown "within these liberties." This act was repealed four years later. In 1680 a duty of two pence per pound was levied on imported tobacco. In 1680, (15, Vol. III), the Colonial authority reports, "Most people plant as much tobacco as they spend." Honey was raised in

Wethersfield as early as 1648. In 1650 an inventory includes "11 skipp of bees," valued at nine pounds, (40, p. 622).

The colonists very quickly supplied themselves with cereals and vegetables. Naturally to get an adequate supply of live stock required much more time. The first settlers from Massachusetts brought with them one hundred and sixty head of live stock and later settlers no doubt brought many more. Wild hogs are mentioned in the early records which may have been relics of the first adventure to Windsor in 1633 to 1635. Breeding naturally increased the number of swine more quickly than of dairy stock and as early as 1637 pork was one of the supplies furnished to the force which fought the Pequots.

The keeping of dairy stock, sheep and horses was handicapped by the scarcity of good hay land and pasture. Eliot notes, (25), that the first settlers by tide water had so much salt marsh mowing that they improved the land nearest at hand and when, with growing population more was needed for meadow they made use of old land without breaking up more.

Salt marsh is neither good pasture nor is its hay the most suitable for feed. Of the meadow and pasture grasses at present used in Connecticut all, with possibly one or two exceptions are introduced species (10). To establish good mow land or even good pasture in a new country, having only rather inferior herbage, was a work of considerable time. Even in Eliot's time good hay was scarce.

In the revision of the Colony laws in 1672 to 1673 an act required every male between forty and seventy, fit for labor, excepting certain magistrates or ruling elders, physicians and school teachers, to work for one day in

June, cutting and clearing land as directed by the selectmen for the encouraging of sheep raising. Nine years later the law was modified, authorizing the townsmen to call forth their inhabitants at such time as they think best to kill the brush.

Before considering what was wrought by this colony of farmers in the first sixty or seventy years of their struggle with the wilderness there should be noticed in particular some of the hindrances and obstacles to progress which had to be overcome.

As has been said their field and garden tools, either brought from England or else made on the same pattern at home, were of the simplest sort; none of them, except a clumsy plow, of a kind to use with draft animals. Sowing, cultivating and harvesting were all done by hand.

Their farming tools, moreover, were of a kind designed for tilling soil long under cultivation, not for subduing forest land or scrub growth.

Though at first, as a rule, the Indians were not very unfriendly to the colonists, their attitude soon changed. The pushing of settlements inland incommoded the Indians. They had further embarrassed themselves by parting with much of their cleared land and these things, together with their innate joy of plunder, murder and torture soon made them a menace to the settlers. Robbery and murder became frequent.

The Connecticut settlements were chiefly harassed by the Pequots and in May, 1637 an expedition left Saybrook and near Groton met the Pequots in their fortified place and after a severe fight killed nearly seven hundred of them, only five escaping alive (26).

But another account says that in the Pequot fight at "Mistick" at daybreak they took the fort after two hours'

fighting, by firing it, slew the two chief sachems, one hundred and fifty fighting men and one hundred and fifty old men, women and children, with the loss of two Englishmen. (65).

Hon. John H. Perry, in a paper on "The Great Swamp Fight in Fairfield" states that the remnant of the Pequot nation immediately started to migrate to the Hudson and passing westward was overtaken and besieged in a swamp in Fairfield. There were eighty strong men with two hundred women and children. Loath to destroy the women and children, under a truce two hundred old men, women and children were allowed to come out and surrender. After a fight, not very sanguinary, about sixty or seventy Indians broke through and escaped. This ended all trouble with the Pequots.

After this there was no further organized fighting with the Indians for thirty-eight years.

The expedition from Saybrook was provisioned from the various Connecticut settlements and commanded by Captain John Mason who reports, (5), "Our commons were very short, there being a general scarcity throughout the colony of all sorts of provisions"—"we had but one pint of strong liquors among us in our whole march"—"(the bottle of liquor being in my hand) and when it was empty the very smelling to the bottle would recover such as had fainted away, which happened by the extremity of the heat."

In spite of this victory, individual cases of robbery and murder were not infrequent and the farmer needed to keep his weapons constantly ready for use. As when Nehemiah rebuilt the walls of Jerusalem, "Every one of them with one of his hands wrought in the work and with the other hand held a weapon." In 1643 it was noted that

"The order for one in each family to bring his arms to the meeting house every Sabbath hath not been fully attended to."

King Phillip's war began in 1674 and in this the Narragansetts joined.

The Great Swamp Fight, near Kingston, Rhode Island decisively defeated the Indians but in 1676 Philip was again on the war path and there were massacres in Massachusetts and Rhode Island; but in June, in a series of fights, three or four hundred of the Narragansetts were killed and later in the year Philip himself was hunted down and killed. By 1688 the Indians were generally suppressed (26). But Dwight (24, Vol. I), states that with the Indians the colonists had to contend from 1675 till 1783 and within this period there were seven wars with them; five stimulated by the French, King Philip's war and the revolution.

In King Philip's war little damage was done in this state but its armed forces were used in defending other regions from the common enemy.

Besides the threat from the Indians, wild animals were a great annoyance and did much damage so that bounties were almost continually offered for their destruction. In Windsor in 1647, (5), a panther killed nine sheep in a yard. He was tracked and killed for which a bounty of five pounds was paid as allowed by law. Wolves were the most common and persistent pests. From the beginning to the end of the century bounties were paid for their destruction ranging from eight to thirty-two shillings per head. In 1640 by the town of Hartford "It is ordered yt Learance Woodward shall spend his Time abought killing of wolfes & for his Incoragmentt he shall have 4s 6d a weeke for his bord in casse he kill not a wolfe or a

deare in ye weake; but if he kill a wolf or a deare he is to pay for his bord himselfe & if he kill a deare we are to Have it for 2d a pound," (14, VI). (Fearlessly this scribe flouts all old world traditions in matters of orthography and blazes a new way for the speller, with the freedom of the new world, to the joy of his readers in all generations.)

In 1693 Stratford voted a wolf hunt, with a bounty of three shillings per day for horse and man. A day was set, all to be ready at seven A. M. on the hill at the meeting house by the beat of the drum. No record is given of the killing (49, p. 289).

Blackbirds were also a nuisance and a bounty of ten shillings per thousand was paid for their destruction. Even flocks of wild pigeons were destructive to grain.

As early as 1644 wheat blasted in Connecticut and New Haven, (75, I.), and in 1679, (15, III.), there is complaint made of "an unaccountable blast on wheat and pease." Later in an election sermon, (15, III.), reference is made to God's smiting with "blasts, mildews, caterpillars, worms, tares, floods and droughts."

In a report by the Governor to the British Committee for Trade and Foreign Plantations, he says: "Besides for sundry years past the holy providence of God hath smitten us year after yeare & these three or four yeares past there is a worm breads in sd. pease which doth much damnify them so that we are like, (by reason of said losses at home and the heightened price of goods from abroad), to remain a poor but loyal people."

There were besides, the usual vagaries of weather and miscalculation of the crops most needed, which caused serious discomfort.

In 1637 there was scarcity of corn due to Indian dis-

turbances and the absence of men engaged in the Indian war. The colonists were forced to buy corn of the Indians in Massachusetts. Corn rose to twelve shillings per bushel, but fifty canoes came down later from Deerfield, Mass., which gave great relief. Again in 1638, (15, I.), it was necessary to import corn which it was ordered to "goe" at five shillings six-pence in money, in wampums at three a penny, six shillings per bushel, or in beaver at nine shillings per pound.

In 1643 Winthrop reports that corn was very scarce all over the country because of a cold, wet season, ravages of pigeons and mice in the barns. The mice also damaged orchards by girdling the trees.

But the next year there was a glut of corn, prices fell and the growers were forbidden by the General Court to sell "out of the river" except to two agents who were to pay four shillings per bushel for wheat and three for corn and rye and who undertake to transport it over seas. This overproduction may have been due, in part at least, to the extraordinary bounty offered in 1640. The merchants are to pay on the return of the ship or as soon as return may be otherwise made in the best and most suitable English commodities. Subsequent lawsuits prove the failure of the scheme. This was the end of the first "pool," undertaken to foil the "middleman" and by government action to sustain prices in a time of over-production.

In 1662 it was forbidden to convey away out of this river any corn or provision from any plantation on this river. 1675 was another lean year as far as the staple corn was concerned. The Colony, in reply to the Massachusetts authorities, say they will supply what provision for the army as they can, "but corn being very scarce with

us and the seat of war within our borders, we cannot do all that is desired."

Regarding the population of Connecticut in this century we have no exact figures. The most reliable estimate is as follows (72, p. 9):

In 1640	2,000	1680	13,000
1650	6,000	1690	18,000
1660	8,000	1700	24,000
1670	10,000		

"We compute the Indian neighbors of this Colony to be about 500 fighting men" (1680). At this time there were not above thirty slaves in the Colony.

In a community without extensive trade or business relations with other sections of the country, a community almost exclusively engaged in tilling the land and business immediately concerned with it, current money was scarce. We find therefore in the records of the General Court and of town governments schedules of rates at which country produce might be used for payment of a part (often one-third) of taxes.

Thus the highest exchange price for winter wheat was five shillings per bushel, in 1677 and 1698. The lowest was four shillings in 1653.

Corn exchange prices ranged from two to four shillings, rye and pease from two to three shillings sixpence per bushel (15, III). Apples were quoted in 1653 at two and a half to three shillings per bushel.

It remains to consider the condition of agriculture in the Colony at the end of the seventeenth century. The condition of agriculture was the condition of the Colony, for while the settlers on the sea and river coasts began

trading and commerce,[12] yet agriculture, with lumbering, stock raising and dairying as the chief business aside from tillage crops was the almost universal employment.

The State was secured against the Indians and was increasing in population and the area of tilled land. There is no evidence of an improvement in the farming tools used. The food crops and the vegetables of England were raised with success and productive orchards had been established. The quality of the meadows and pastures was very poor, there being no meadow grasses which were well suited for dairy stock.

Governor Winthrop of Massachusetts writes in 1660 to an English correspondent (37, VIII), "Now the country doth send out great store of biscott, flower, peas, beife, butter and other provisions to the supply of Barbados, Newfoundland and other places, atc." "This country is now well stored with horses, cowes, shepe and goates." No doubt the production and commerce of the older Colony was much larger than that of Connecticut but Connecticut shared in the general prosperity of the New England Colonies.

In the same year Maverick (cited by Whedon, 75), says, "For the southern part it is incredible what has been done there." "All through the land there was plenty of pears, apples and other fruit, muskmelons, watermelons, etc."

A fair idea of the progress of agriculture may be gleaned from the report of the Governor of the British Committee on Trade and Foreign Plantations in 1680. He states that the commodities of the country are peas, rye, barley, Indian corn and pork, beef, wool, hemp, flax,

[12] In 1680 there were 27 vessels owned in the state, the largest of 90 tons, with a total tonnage of 1,030 engaged in trade from river and coast ports.

cider, perry and tar; deal boards, pipe staves, horses. What was produced above the local demand was mostly transported to Boston and there bartered for clothing, though some small quantity was shipped to Barbados, Jamaica and other of the West Indies and there bartered for sugar, cotton and rum. For material for shipping there is good timber of oak, pine and spruce for masts, oak and pine boards, tar, pitch and hemp. "We are but a poor people, we have lost and spent much of said estates in the last Indian war. Said expense with our loss cannot be estimated less than 30,000 pounds and no other advantage gained by it than the riddance of some of our bad neighbors . . . For the most part we labor in tilling the ground and by that time a year's . . . and labor hath gathered some small parcel of provision and it is transported to the market at Boston and then half a crown will not produce so much goods of any sort as ten pence within England."

"We cannot guess as to the number of acres unsettled. Most that is fitt for planting is taken up. What remaynes must be subdued and gained out of the fire as it were, by hard blowes and for smal recompense" (15, Vol. III).

The history of agriculture in Connecticut would not be quite complete without this note. In 1644 "The proposition for the releife of poore schollars att Cambridg was fully approved of, and thereupon it was ordered, thatt Josua Attwater and William Davis shall receive of every one in this plantation whose hart is willing to contribute thereunto a peck of wheat or the value of itt." In 1645 Mr. Attwater reported that he had sent from Connecticut forty bushels of wheat for the college at Cambridge although he had not received so much. In 1647 "The Governor propounded that the Colledge corne might be

forthwith paid — it will be a reproach that it shall be said New Haven is falne off from this service."

It is interesting to note the attitude of the legislative body towards tobacco and alcoholic beverages in the seventeenth and eighteenth centuries and to compare it with the attitude at the present time.

Tobacco was grown in the Colony as early as 1644, rum was imported from the West Indies and later made in the State from the juice of cornstalks, though never to any great extent. Intoxicants were freely used in the community by clergymen and all classes of their parishioners. President Stiles of Yale College enumerates among the wonderful orderings of divine Providence which conspire towards the establishing of the independence of America, "Heaven has led us to the successful experiment on corn stalks from whence it is probable may be made an abundant supply of molasses and rum for this whole continent." Cider was a common beverage in the family and was not by any means a spiritless drink. Licenses were required for selling strong liquors and the maximum prices were fixed by statute (15, IV).

Captain John Mason, as we have seen, found use for strong liquor in the Pequot War. In 1780 Congress called for army supplies from this state and among them were named 68,558 gallons of rum.

But tobacco, so vigorously condemned by that misocapnic sovereign, James I, in his Counterblaste of Tobacco, was barred by the Colony.

In 1647 it was ordered that no one shall take tobacco publicly on the street or in fields or woods unless when he is on a journey of at least ten miles, or at the time of repast commonly called dinner, or if not taken then, not above once a day at most, and then not in company with

any other. By the code of 1650 persons under twenty-one and all others not already accustomed to it were forbidden to use the weed without a physician's certificate. No one could publicly use tobacco on streets, highways, in barns, or on training days in any public place. There was however a gradual decline in tobacco morals for in 1680 its use was restricted to that grown in the Colony and in the next century tobacco became a considerable article of export and inspectors were appointed to see that only merchantable tobacco was sold.

In the twentieth century the pendulum which marks the effort to promote temperance in individuals by legislative acts has swung to the other extreme. Tobacco is used everywhere by clergymen, physicians and all classes in the community, both men and women, but the making, selling or carrying of any alcoholic beverage or bringing it within one hour's steaming distance of

" * * * thee,
Sweet land of Liberty"

is contrary to the Constitution and statute and punishable by fine and imprisonment.

It would seem that the pendulum could hardly swing further in either direction and may come back to the region of temperance in habits, legislation and language.

Agriculture in the Eighteenth Century

This period witnessed great changes in Connecticut, political, religious and economic.

The danger of extermination by Indians was wholly past. They continued for some time to be a plague, inclined to plunder, but in 1763 the Governor reports

(Appendix to the Public Records), that the Indians are "in peace, good order and inclined to idleness."

Nor was the Colony any longer threatened by a very dangerous lack of food.

Trade increased and manufacturing began on a moderate scale.

As late as 1790 it is probable (72) that nine out of every ten bread winners in the State were engaged in some form of agriculture. A century later only three out of ten. At the close of this century ninety-eight out of every one hundred of the New England population could trace their origin to England in the narrowest sense.

The following figures of population in Connecticut (72) "may be accepted as expressing the best judgment of students of history and statistics at the present time" (1909).

In	1700	24,000	
	1710	31,000	
	1720	40,000	
	1730	55,000	
	1740	70,000	
	1750	100,000	
	1760	142,000	
	1770	175,000	
	1780	203,000	
	1790	237,635	

Up to the Revolutionary period there was an average increase of about 33 per cent in each succeeding decade. From 1770 to 1790 the increase per decade averaged only about 18 per cent. This increase, reports the Governor, "Under the Divine benediction we attribute to industrious. temperate life and early marriage."

In 1713 two-thirds of the area of the State was settled, and by 1754 the whole State was occupied.

The housing of the colonists became more substantial. Brick was more often used in building. As late as 1770 brick was imported from England and Holland, perhaps as ballast. But most bricks in Colonial buildings were

made at home. (As early as 1639 the Henry Whitfield house in Guilford was built of stone and is still standing.)

The household in New England generally was a self-sustaining unit.

There was little care for ornament or design. In the first half of the century, at least, the household furniture was likely to include shoemaker's tools, leather tanned in the neighborhood, surgeon's tools and apothecary's stuff, occasionally carpenter's and blacksmith's tools, and a cider press. A spinning wheel was almost always in the house and often a loom. The wood turner made plates, etc., from "dish timber," probably poplar or linden (10).

At this time "through New England men, women and children wore homespun; linen shirts, tow cloth skirts and breeches and woolen socks. Buckskin and lambs skin breeches were common." Coats for heavy weather were made of deerskin. These statements represent conditions in the first half of the century among even well-to-do farmers throughout the Colony. There was, of course, a small fraction of the people, living near centers of intercourse and trade whose houses and dress were more elaborate and the dress of all classes gradually improved in material later in the century.

Cereals and meats of all kinds were abundant but there was no means of keeping either meat or vegetables in fresh condition. Many families lived through the winter on smoked, salted and pickled food. But milk, butter and cheese were available. Fruit, such as apples, could be kept well into winter. Housewives pickled Indian corn and other vegetables, nuts and oysters, they dried apples and made "apple butter." Beer, cider, brandy and rum were the ordinary beverages.

Beer was brewed at home and spruce beer was used at sea against scurvy (4).

From 1715 to 1750 a great change came over the Colonies. "No war, no constant danger from the French or Indians, no menace to shipping on the seas." Hanoverians came to the English throne and there followed what Burke called "a wise and salutary neglect." "The home government giving up the idea of rigidly carrying out the laws of navigation and trade, suffered a generous nature to take her own way to perfection."

Thus the colonists entered on an era of progress and consequent prosperity.

The clearing of land, raising food, producing clothing, with the establishment of commerce, by which some necessities and comforts were provided which it was not possible to make at home, were practically the whole business of the inhabitants, until the final struggle for independence in 1776, when a seven years' war and six years or more of labor in organizing and establishing a civil government left little time or thought for improvement in the methods or tools of agriculture which marked the next century.

The only plow in use, up to the nineteenth century was an unwieldy, heavy, wooden affair. The harrow was wooden, with wooden pegs (45). The farm tools were made locally; rakes, forks, axe helves, shovels with wrought iron edges, flails, baskets and yokes, cheese presses, bowls and paddles (53).

The means of transportation were, of course, very limited. Carts with one or two horses were used on the farm, but oxen were preferred for the heavier work.

Pleasure carriages were first seen in Middlesex County about 1750 (16), and in Litchfield in 1776 and there

were few there until after the Revolutionary War. In 1761 there were only four "chaises" in New Haven.

New England soon became a network of roads and highways, with main routes connecting important towns, country roads and lanes, pent roads and private ways leading to outlying sections (4).

Connecticut roads had a bad reputation. There were few bridges, troublesome ferries and much soft and rocky ground. They were referred to by travellers as "most miserable" and "most intolerable."

These conditions were considerably improved in the latter part of the century and bridges over the larger rivers were more common. As roads are the subject of another paper in this volume no further notice of them is needed here.

As to the principal crops raised in the eighteenth century:

Indian corn continued to be the chief staple crop both for family use and for stock feed. Eliot raised 60 to 70 bushels to the acre and the following year 90 bushels. The Rev. Peters (52), says 40 to sixty bushels are raised on even land; 30 to 40 on hilly land, but this latter weighs 13 pounds to the bushel more than that raised on river land. Dwight, writing in the early part of the nineteenth century, (24, Vol. I), says the average yield of corn is 25 bushels but he has seen crops of 118 bushels.

It was hoped to make the stalks available for the manufacture of molasses. Stiles notes (62), "This is done with only the Topping of the corn without damaging the Ear or Grain. In old York, 8 M. from Portsmo. are erected last week two Mills consisting of three plane Wooden Cylinders with the Improvement of Cogs atop. In these Mills they have already made considerable Mo-

lasses from Corn Tops and some of the Molasses has been distilled into good Rum. It is said that the Produce is at the rate of two Bbls. Molasses to an acre of Corn." "At Dr. Gales in Killingworth, As I had first tasted good Molasses, 21st. Oct. at Greenfld made of Cornstalks, so here Dr. Gale first showed me Spirits made of the Juice which I tasted and also saw it sink Oyl." (62, Vol. II). And later on, "At Middletown ten thousand gallons of stalk juice were delivered in this fall to one distillery which distilled near a thousand gallons of good rum."

The business began much earlier in the century. In 1717 (75, Vol. II), the General Court granted the sole right to make molasses from Indian corn to Edward Hinman of Stratford. It does not appear that this business ever became extensive.

Wheat was considerably grown until the appearance of the Hessian fly when wheat growing was nearly abandoned. There were few varieties grown of both summer and winter kinds. "But corn is very much the staple and a scarcity of it affects the country more than a failure of wheat."

Dwight, (24, Vol. I), says that the Hessian fly first appeared in New England in 1787, entering Fairfield Co. and advancing about twenty miles a year. Peters says that wheat generally yields from 20 to 30 bushels per acre (52). Dwight puts the average production at 15 bushels though he has known of 40 bushels per acre.

Rye and barley were also grown.

Regarding forage, Eliot, in 1749, (25, Vol. II), complains of the scarcity of hay and corn which is increasing. The stock of the country has outgrown the meadows so that the high price of hay limits the live stock. In a hard winter the scarcity of hay must be made up with corn

and rather than lose cattle the farmers pinch their families.

He mentions only two grasses native to the country, Herd's grass or timothy and Foul Meadow grass, which he pronounces to be much the best of the two. The seed of these and of clover could be bought in market in 1765. The lack of good meadow both for pasture and hay continued till the beginning of the nineteenth century. "Agricola," writing to the Connecticut Courant, March 3, 1784, says: "The parching heats to which this country is exposed often occasions a want of summer pasture as well as winter fodder. It is therefore of the utmost moment that the American cultivators should be informed that artificial meadows constitute one-half of the rural riches of Europe." He states that any farmers who wish to experiment in the matter may get the seed from Normandy by applying to the French consul's office for which the only charges will be its purchase price in Normandy with land carriage from Caen to Port l'Orient. This is made possible by the generosity of His Most Christian Majesty, the King of France. He then discusses the merits of clover, sain foin, lucerne, (alfalfa), and Hyvernage, a species of winter vetch.

The time of the introduction of potatoes seems to be somewhat uncertain, probably between 1705 and 1750 (10). Andrews states, (4), that they were not introduced until after the advent of the Scotch-Irish in 1720, and they did not for some time become a common vegetable.

A few appear, probably as a curiosity, at a Harvard dinner in 1708 (75). Trumbull gives the date of their introduction into Connecticut as 1720 (70, Vol. I). They were first seen in Windsor in 1760 (65), and were little

used there till after the revolution; (53), but a correspondent in Saybrook writes to President Stiles in 1767, (61, p. 463), "We improve in potatoes in this colony exceedingly. Many farmers raise 500 (bushels) per An. I don't think myself stored without 150 bushels per An. They make butter and beef and store excellently well."

Wethersfield is the traditional home of the onion and there is record, (64), of their being an article of trade as early as 1710. Later large quantities were raised here and shipped to New York.

In 1780 Wethersfield citizens protested against an act of the Committee of Public Safety which forbade shipment or sale of produce outside the State. Anticipating a great demand Wethersfield had raised more onions than ever and many more than the army and navy could use, and the excess they could neither sell nor barter for the selling to army and navy had to be done through an agent of the government who would take only a moderate share of the crop. The growers were therefore in great distress.

A traveller notes in 1788 that "Wethersfield is remarkable for its vast fields uniformly covered with onions, of which great quantities are exported to the West Indies."

The common garden vegetables and herbs as we have seen were usually raised in the preceding century.

Maple sugar was made in Norfolk and Goshen and probably in many other parts of the Colony. In 1774 16,000 pounds were produced in Norfolk and in 1784 a third more (62, Vol. III).

As we have seen, fruit, particularly apples, were grown in considerable quantity early in the settlement and were used largely for making cider. The planting of orchards

apparently increased with the increasing quiet and prosperity and more attention was paid to the finer varieties.

Dudley, states that in 1726 Pearmain, Kentish Pippin and Golden Russetin were esteemed apples in New England and Orange and Bergamont were cultivated pears. It is likely that at first many of the apple trees were seedlings and their fruit was mainly "cider apples" rather than good eating varieties. In a paper on the Pioneers of Pomology in New Haven, (44, Vol. I), the author says that Benjamin Douglass was the first propagator of fine fruit in New Haven known to him. In 1775 he planted 64 cherry trees, all grafted, White and Black Ox Hearts, Honey Heart and May Duke. In 1780 or soon after grafts of Delancey pear and a large, sweet, red apple were distributed and the pear, called Jonah, was still alive in 1865.

Nathan Beers, before 1779 grew Catharine, Jargonelle, Warden, St. Michael's Bergamont and many other pears. T. S. Gold of West Cornwall reports (21), that he has a Seeknofurther, grafted near the ground, the last survivor of an orchard which he believes was set out in 1760.

Of other than food crops, the growing of flax, hemp, silk and broom corn was undertaken with more or less success. Broom corn was early cultivated in Wethersfield and in 1797 the first broom was made from this plant (64). It is matter of tradition that Benjamin Franklin introduced this plant in 1781 from seed which he saved from a whisk broom that came from the West Indies. Previously brooms were made from splints.

Hemp was greatly needed for cordage for the vessels built on the coast and the Indian hemp was not satisfactory in quality or sufficient in supply. The growing of English hemp became necessary. In 1734, (15, Vol. VII),

the Colony offered bounties for good, well-dressed, water-rotted hemp in lots of not less than 50 pounds, raised in the Colony and for "well wrought canvas or duck." In 1740, (10), every family was ordered to get at least a spoonful of English hemp seed and "sow in some frutfull soyle, at least a foote distant between every seed, and the same so planted, shall presarve and keepe in husbandly manner for supply of seed for another yeare."

Later bounties were offered by the court for fine linen cloth woven in the Colony. In 1787 the State ordered that forty shillings per acre of land on which hemp was raised should be abated by the assessors on the tax of said land and after 1789 a duty was to be laid on imported hemp.

More important to the families of Connecticut was flax. Cotton goods were very scarce. "Cotton wool" had long ago been imported from the West Indies in very moderate quantity but it was used not for making cotton fabrics but for the lining of vests to be worn as a protection against the arrows of the Indians. In 1643 every family in New Haven plantation was required by law to have a coat of cotton wool well and substantially made, "so as it may be fit for service and custom"; and probably the law required this until there was no longer danger of an Indian attack.

Until the beginning of the nineteenth century the common wearing apparel, at least outside the centers of population, as well as other household fabrics, were homespun and spun and woven by the family or the immediate neighborhood from home-grown wool and flax. In some places this home weaving continued well into the nineteenth century but probably little flax was grown after 1830. Apparently it was grown on a considerable scale

for a time for its oil and the cake from the presses was used for feed as it is at the present time.

The growing of mulberry trees and silk worms and the manufacture of sewing silk and silk fabrics was an industry which had its rise and considerable development in this century. Stiles states that the first silk worms raised in New England were grown by Rev. Dr. Wigglesworth of Harvard College about 1727. The industry began in Connecticut about 1732, (12), and was not abandoned till about 1840.

In 1734, (15, Vol. VII), the production of silk was encouraged by bounties offered by the Colony for the production of sewing silk and silk fabrics from silk worms bred and nourished within the Colony.

In 1747, Governor Law wore the first coat and stockings made of New England silk and in 1750 his daughter wore the first gown made of the same material. Governor Leete raised silk and wore a suit of it about 1783.

President Stiles of Yale College took great interest in the project and probably did more than any one else to make possible a chance of success in the industry, by his careful studies in breeding and feeding the worms and in getting mulberry trees planted throughout the State, the foliage of which is the sole food of the worms. In the library of Yale University is a manuscript volume with the title, "Observations on the Silk Worm and the Culture of Silk, A. D. 1763, Being the Journal of an Experiment in Newport, R. I., in the Summer of 1763 in Raising about 3,000 Silk Worms. By Ezra Stiles." He spared no manual labor, nor painstaking observation of his worms and kept a full record of his daily observations. These cannot be further noticed here, but it is pleasant to see that this eminent divine named the three worms

which he had under very particular observation, for convenience of reference, General Wolfe, Oliver Cromwell and Yeo. "General Wolfe and Oliver Cromwell, his companion, very sluggish, eat a little or rather nibble." "Yeo has not yet settled himself. Oliver in indolence below." etc.

In 1788, 1789 and 1790 Stiles sent to each of eighty ministers in the State enough mulberry seed to grow 4,000 trees, with the understanding that at the end of three years three-quarters of them shall belong to the planters and the others distributed by the minister gratis in his parish. In 1784 the State offered bounties for growing mulberry trees under suitable conditions. In 1789 a writer in the Connecticut Courant states that there were about 12,000 mulberry trees in the State. Silk culture was begun in Mansfield and neighboring towns as early as 1760 and there it maintained its foothold until about 1840.

The largest amount of reeled silk produced in any one year in Mansfield is stated to have been 7,000 pounds, but in general not above 3,000 pounds. The New London Gazette, of March 31, 1769, states that William Hanks of Mansfield is now "cultivating a large vineyard and last year raised silk sufficient to make three women's gowns." A very limited amount of silk was produced in many places through the State until about 1835 when a silk bubble business grew rapidly until about 1839 or 1840 when it burst and ended silk culture in this State. The *Morus multicaulis* is a mulberry growing more rapidly and having much larger leaves than the black or white mulberry which had been grown hitherto. Nurseries of the *multicaulis* were established and the prices of trees rose from one and two dollars apiece to as much as $300 to $500 per hundred. In 1839 the nursery men suffered from the

financial panic of 1837 and it appeared that the *multicaulis* was not hardy enough for the northern states. Prices went to pieces and many nurseries were ruined. To close the whole story a fatal blight of the mulberry trees became common all over the country which resulted in the death of the worms and the practical abandonment of the business. But the failure of silk production was inevitable even if there had been no panic and no *multicaulis*. The feeding of silk worms can only be successfully carried on where hand labor is exceedingly cheap and abundant and the scale of living is very low.

Tobacco had been grown in Connecticut in the preceding century for home consumption but in the eighteenth century it had become an article of export. In 1753 inspectors were appointed to pack all tobacco which was offered for sale. Stiles states that tobacco was packed in hogsheads and shipped to the West Indies. It sold for five-pence the pound. The date is not clear but probably before 1768.

The acts of Connecticut published in 1784 provide that "Whereas Tobacco is or may be a considerable Article of Exportation and ought to be under such Regulation as to prevent Fraud therein," each town was to elect two or more surveyors or packers of tobacco, "who shall carefully survey and search the Tobacco by them to be packed and shall cull out and separate all such Hands of Tobacco as are in Whole or in Part damnified in any way or by any means whatever: and shall pack or press no Tobacco but what is judged by him to be sound, well ripened, sufficiently cured and every way good and merchantable." The packer is required to brand each cask or container which he packs with the first two letters of his name and with the name of the town wherein he dwells.

No one may pack his own tobacco or transport any unbranded tobacco.

The object thus sought in 1784 is one of the aims of the Connecticut Valley Tobacco Improvement Association very recently established in this State.

Along with the more strictly agricultural business of the farmers of the Colony should be mentioned the tapping of pine trees and the making of tar, pitch and turpentine which, used to some extent at home, were articles of export.

From the earliest days sheep and hogs were commonly raised and their numbers increased easily and rapidly. Pork was sufficiently abundant to be exported. More sheep were raised in Connecticut, (in 1781), than in any two of the other colonies. "Their wool is better than in other colonies but not so fine or good as the English" (52). The wool used for clothing or bedding was spun and wove in the separate families. In 1774 the General Court notes that "It is practiced by some particular inhabitants to turn large flocks (of sheep) on the highways with a keeper and thereby eat up and destroy the herbage therein to the great detriment of the poor inhabitants of such towns," and orders that no one shall turn more than fifty on the highway without getting permission from the town (15, Vol. 14).

The number of cows increased more slowly but butter and cheese were exported, at least in the latter part of the century.

The town of Goshen early established a reputation and foreign trade in cheese which will be noticed later.

Trouble from wolves continued through the eighteenth century, though their number was very materially reduced and at its close was probably so small as to make the

damage done by them infrequent. Bounties were offered for their destruction partly by the Colony or State and partly by the town, as high as fifteen pounds, "old tenor," in 1750, three pounds in 1784, which represent the extremes.

When Goshen was settled about 1730, bears, raccoons, wolves and foxes were plenty and for a long time thereafter. Beavers were also found.

The wolves were especially troublesome and injurious.

In 1784 four wolves appeared one Sunday in the vicinity of Norfolk and fearing for their stock an alarm was given to the congregation in church. About eighty men turned out and after a chase got all the marauders. The church service was over, for them, and "the whole party then retired to an Inn and spent the day in joy and festivity" (5).

Bears were taken in Litchfield County between 1760 and 1770, (16) and wild cats occasionally destroyed sheep and lambs. About the same time (5), a bear was killed in Bethany which had destroyed calves and bee hives and even had the effrontery to enter a house and lap up the milk and cream. A panther, (5), in 1767, which had killed nine sheep in a yard at Windsor, was tracked and killed.

Dogs, first cousins to the wolves, had become common and developed that fondness for mutton which their age cannot wither nor custom stale.

In 1738 a law provided that if a selectman declared that evidence of harm to sheep or cattle was, in his opinion, satisfactory, the dog concerned might be killed and the owner be liable for damages. Any dog found at large in fields or woods without a master might be lawfully killed.

Various other laws regarding damage by dogs were passed from 1716 to 1786.

A minor pest, then as now, was mice which occasionally girdled orchard trees (25, Vol. II).

Blackbirds were enough of a plague in 1711 to cause the Hartford authorities, (14, Vol. VI), to require every rateable person to kill one dozen blackbirds in the four months beginning with March or else to pay a fine of one shilling. Those who kill more than a dozen may receive a penny apiece.

Wheat had been seriously affected by "blast" which came to be rightly attributed to the presence of barberry bushes. In the Colonial Records for 1726, page 10, it is recorded "Whereas the abounding of barberry bushes is thought to be very hurtful, it being by plentyful experience found that where they are in large quantities they do occasion or at least increase, the blast on all sorts of English grain," the inhabitants of each town are empowered to agree on the utter destruction of such bushes within the town and the time and manner of their destruction.

A fine of ten shillings is imposed on any one who opposes the destruction, to be paid for every month he opposes until he gives free consent. Provided that if the bushes are depended on for a fence, the town shall make just satisfaction.

In 1784 the Laws of the State of Connecticut provide that any one, with the advice and consent of the civil authorities and selectmen of the town may, during March, April, October and November, enter any lands where barberry bushes are growing and dig up and destroy them without being liable to any action, suit or damage. In 1796 the town of New Haven, (16), granted $200 for the

purpose of destroying the barberry bushes within its limits and they were "principally destroyed." "The method adopted to destroy them was to eradicate them."

This was nearly one hundred and fifty years before botanical studies proved a direct connection between the blast of wheat and barberry bushes. The farmer knew nothing of *Puccinia graminis* and "heteroecious rusts" which must spend a part of their life cycle on one plant and a part on a different one. But they adopted a plan which was effective and which the farmers of the middle west are now carrying out at a very considerable expense.

No extended discussion of economic history is here in place, but because farm produce had largely to serve the purpose of money in the exchange of service, a brief notice of financial conditions is proper.

The amount of money in the Colony had been relatively very small ever since its settlement. The need for it had also been quite limited.

As we have seen the dwellers in Connecticut for a century and a half had been engaged in settling and subduing a wilderness, producing food and clothing for their own families and having very limited intercourse or trade with the world outside.[13] Barter took the place of a common medium of exchange. But this scarcity of money became an acute embarrassment when intercourse between communities and foreign trade developed. The close of the war of independence (72), found finances in almost hopeless confusion and there was little improvement before the end of the century. All coins, excepting coppers, were foreign, many badly worn or mutilated. The Spanish

[13] A farmer writes (19, Aug, 18, 1788), "At this time my farm gave me and my whole family a good living on the produce of it and left me, one year with another one hundred and fifty silver dollars; for I never spent more than ten dollars a year, which was for salt, nails and the like. Nothing to wear, eat or drink was purchased, as my farm provided all."

"milled dollar" or "piece of eight" was most common, obtained in the West India trade and after the war this and its subdivisions were the recognized unit of account, equivalent to the dollar. The other most common coins were the French guineas and pistoles, Portuguese moidores and "Johannes or "Joes"[14] and Spanish doubloons and pistoles.

The supply of fractional currency was inadequate and silver pieces were often cut in halves or quarters. The coins of Great Britain were in very limited circulation. In 1785 Congress made the silver dollar the currency basis of a decimal system. The equivalent of the dollar in New England was six shillings but was different in different states. Large amounts of paper, "Continental" money entered circulation during the war and succeeding years, the value of which went from bad to worse.

In 1780 one dollar in silver was the equivalent of 65 dollars in paper money which became "not worth a continental" when Congress refused to accept its own paper money in payment of postage.

In November 1777, (15), Congress recommended that commissioners be appointed in the several states, New Hampshire, Massachusetts Bay, Connecticut, New York, New Jersey, Pennsylvania and Delaware to meet in New Haven, to ascertain and regulate the price of labor, manufactures, internal produce and commodities, imported and to recommend legislatures to enact suitable laws in accordance with their recommendations. There is a considerable list of these recommended prices in lawful money, six shillings to the dollar. (The "dollar" was the equivalent of a "piece of eight").[15] Among them are:

[14] A gold coin, worth about nine dollars coined by John (Johannes) a king of Portugal.

[15] A suggested explanation of the dollar sign, $, is the use of the numeral 8 with two vertical lines to give it a monetary significance.

Wheat, peas, beans, per bushel	$ 1.61
Rye or rye meal	1.08
Indian corn or meal	.75
Oats	.50
Butter, (firkin or cask) per pound	.20.7—.22
Neat leather shoes	1.99
Best American steel, per ton	66.40

All through the history of the Colony[16] and especially towards the latter part of the eighteenth century we find efforts made to regulate the price both of labor and commodities and to fix the price at which commodities could be used for the payment of a part of the state or town taxes. Sheldon cites, (57), "colony pay" at which grain and other articles would be received for colony taxes, "town prices" at which the same things would be received for town taxes or for exchanges, "provision pay" was grain or other food.

Thus, for paying town debts the value of wheat was fixed at 6 shillings the bushel in 1722, 12 shillings in 1740, 16 shillings in 1742, and 17 in 1746, "old tenor." Values for other cereals are also given.

The wages of laborers in Goshen (29), were fixed at town meeting at 5 shillings a day, from Oct. 1 to the last day of February and at 6 shillings a day for the rest of the year. How this regulation was received, whether it met with objection or was disregarded does not appear. The mention of penalties is not prominent and one imagines that the law was a convenience to facilitate barter rather than a stern restriction to prevent profiteering. But in a friendly neighborhood where the struggle for wealth was

The shilling would then be 12½ cents, one-eighth of the dollar or the piece of eight.

[16] As early as 1641 (65), the General Court regulated by statue the scale of prices for different kinds ol labor, hours of day labor, etc.

not pressing, because hardly obtainable, some standard for exchanging provisions which did not involve money must have been a great convenience.

If we agree to call a bushel of wheat this year $1.61 and of corn 80 cents, we manage to get one or the other without dispute, though the dollar itself is far from us.[17] The Mexican, whose offer to lend his mule to a stranger was thankfully accepted, replied "Oh, sir, I have no mule but I beg you to receive the compliment." In like manner the farmer might say to his shoemaker, "I have no dollar to pay for your work but I beg you to accept a bushel and a peck of corn with my compliments."

The general progress of agriculture and its condition at various times in this country may be indicated by the following extracts from the reports made by the Colonial government to the English Committee on Trade and Foreign Plantations. These, or most of them are found in manuscript copies of Foreign Correspondence with the British Government 1668-1748, in State Library, pgs, 126, 145, 149, 165.

"The number of our inhabitants is about 4,000. (!) A little pitch and turpentine and tar are sent to Great Britain. Trade is principally with Boston and the West Indies,[18] consisting in what is chiefly produced by tillage of the land. Most people weave their cloth in their own families. Horses and lumber are sent to the West Indies in exchange for sugar, salt, molasses and rum."

"Coarse cloths and coarse linens are made amongst us of our own wool and flax without which our people must

[17] A shoemaker's ledger from 1770 to 1784 (34), shows that he was paid, for making shoes, in walnuts, butter, sugar, salt, milk, wheat, rye, wool, meats, cider and rum.

[18] At this time only 42 vessels were owned in the colony with a tonnage of 1,225, a very small gain over the year 1680.

go naked or ragged ye greater part of the time. We tan our own leather and make most of our own shoes."

In 1708, "The trade of this Colony is principally what is produced by their tillage of the land. The manufacturers in this Colony are but few. There is but one clothier in the Colony so that our people are necessitated to weave the cloth that they can make in their own families without any thing more than fulling of it, (for the most part), after it comes out of the loom. All we make is not enough to serve the occasions of the poorer sort."

In 1728, "The trade of the Colony is but small. Horses and lumber are exported from home to the West Indies for which we . . . in exchange sugar, salt, molasses and rum. What provisions we can spare and some small yearly . . . of tar and turpentine are sent to Boston and New York and Rhode Island for which we . . . European goods."

The last report to the Committee, made just before the Revolution, (Appendix to Public Records, 1772 to 1775) names the same agricultural products as were common about a hundred years before, with the addition of flax. The staple commodities were pork, beef, pot and pearl ashes.

The principal trade was with the West Indies with an occasional cargo of flax seed to Ireland, to England with lumber and potashes and a few to Gibralter and Barbary with flour, lumber and New England rum.

The value of the exported produce and commodities may be 200,000 pounds. Manufacture of linens and woolens was done in the family, for the use of the poorer sort, laborers and servants. Iron, mostly bog iron, was manufactured to some extent "but hitherto not a supply for our inhabitants."

In the eighteenth century three Connecticut men appear prominent for service in promoting and improving agriculture. There were no doubt others who were also leaders, but these three have left permanent records of their services. Rev. Ezra Stiles, D. D., LL. D., was the President of Yale College, from 1777 to 1795. He has left a record of his studies in the growing of silk worms, diligently carried for two years or more. He was the chief agent in planting mulberry trees throughout the State, which provides food for the silk worms, and he showed great interest and helpfulness in all agricultural matters.

Rev. Jared Eliot of Killingworth, a grandson of John Eliot, the apostle to the Indians, a graduate of Yale, was a clergyman of Killingworth, most acceptable in this calling and it is recorded, (16), that for more than forty years he never failed of preaching at home or abroad a part of every Sabbath. He was also a physician, very extensively employed in the neighboring places "and such was his reputation that he was sometimes called out of the Colony." "Much of his practice was performed gratuitously and in charities he abounded." Connected with his knowledge of medicine was his acquaintance with the botany of the region. He was withal a successful farmer and "acquired a large landed estate which laid the foundation for the wealth of a numerous family." But aside from his example as a progressive and successful farmer, his chief service was in his writings, the most interesting of which is a series of Essays upon Field Husbandry in New England as it is or may be Ordered. This, it is believed, was the first practical agricultural treatise written in this country.

The first of these essays appeared in 1748 and in sub-

sequent years five others, with an index concluding the series in 1761.

He discusses the handling of tilled land, drainage, the grasses which he finds most useful, the production of silk, the use of creek mud as a fertilizer, etc. He introduced and urged the growing of clover which made its way into general farming very slowly (25, Vol. II). He was an experimenter and reported the results of his work for the benefit of the public. Prof. Eli Ives, in an address before the New Haven Horticultural Society in 1837 states that Jared Eliot introduced chicory into this State and that he was the first native citizen of this country to be elected a member of the Royal Society of London. He also appears to have been the first to introduce an agricultural machine, a seed and fertilizer drill. Starting with Jethro Tull's wheat drill which he found very intricate and expensive, "But knew not how to mend it, therefore applied myself to the Reverend Mr. Clapp, President of Yale College and desired him for the regard which he had to the public and to me, that he would apply his mathematical learning and mechanical genius, in that affair, which he did to such good purpose that this new modelled drill can be made with a fourth part of what Mr. Tull's will cost."

Next Eliot wanted a dung drill for which there was no model or precedent available. But Benonai Hylliard of Killingworth, a wheelwright, devised one which was combined with the seed drill so that they became one tool and could distribute 80 bushels of dung per acre, along with the seed. Eliot adds that Tull writes, "Two shillings in horse plowing would do more than forty shillings in dung."

To this Eliot remarks, "I should be glad, if in our climate one-half of this would prove true."

The perfected drill received an award of fifty pounds offered by the New London Society for the Encouragement of Arts, and there was dispute between the estate of Jared Eliot and Hylliard as to the possession of this award.

Agriculture in the Nineteenth Century

The agriculture of the seventeenth century had been a struggle of each family to produce for itself by its own labor, food, clothing and shelter and to defend itself against the attacks of Indians and the ravages of wild beasts which together threatened the destruction of the settlements. It was truly a struggle for existence.

Agriculture in the eighteenth century had been less menaced in these ways but was interrupted by the war with the mother country, by emigration to western lands and by the political agitation incident to the establishment of a federal union. These were matters of great concern to men who had fled from what they considered political and religious injustice, matters not to be left to the tender mercies of a politician class but to be anxiously and often acrimoniously discussed in their town meetings as well as in the state legislative assembly by men who thought more about the future of the State than of improvements in agriculture.

In general each family formed a closed circle, containing within itself both producers and consumers in about equal proportion.

"The close of the Revolution found the State greatly impoverished. The demands made on the State for provisions for the army," says Gov. Trumbull," were "vastly

beyond her just proportion. Payment in depreciated currency involved financial loss and discontent. Connecticut also bore the expense of defending her own coasts, an expense which the federal government refused to assume" (34).

At the beginning of the nineteenth century nine-tenths of the inhabitants got most of their living from the farm.[19] Even those who had other business or profession, artizans, lawyers, physicians and clergymen, all had farming land and supported themselves partly from its produce.

This is illustrated by a statement that the doctors in Canterbury practiced medicine "when they had nothing more important to do," and the inventory of a physician in that region, besides his stock of drugs, included a pair of oxen, thirteen cows, thirty-five head of young cattle and sheep, swine, hay, farming tools, etc. It was usual to set aside a tract of land for the support of the minister and he also was often dependent, in part, for support, on his own work in farming.

It was only a very inconsiderable portion of the population which did not clothe and feed itself, mostly by its own labor and on its own land. The sum total of manufactures was not large and manufacturing, particularly of clothing and other textiles, was chiefly done, not in factories but in families and was, up to this time, largely for home or community consumption.

The methods of agriculture made no marked improvement in these two centuries. Bidwell, (8), says "The ignorance and the conservatism of farmers were to some extent hindrances to agricultural progress, cheap land on

[19] In 1810 about one-tenth of the population lived in towns of between five and six thousand, one-quarter in towns of between three and five thousand dwellers (average thirty-seven hundred), and about two-thirds in still smaller communities.

the frontier discouraged cultivation at home; but these circumstances do not, either alone or in combination, furnish a sufficient explanation of the state of the industry which prevailed.

"In the background lay a condition of much more significance because of its determining force upon all the others. I refer to the lack of a market for agricultural products." The author asserts that with a suitable market, neither ignorance of methods, nor cheap land inviting extensive rather than intensive farming would have stood in the way of agricultural progress. But with little or no chance to sell a surplus of corn, butter, cheese, etc., of what use was it for the inland farmers to raise such a surplus? It was time and labor wasted.

Agriculture was waiting for an increase of non-producing population, and facilities for foreign trade which were to come with improved means of transportation and the growth of manufactures and of shipping.

The condition of agriculture at the beginning of this century is set forth by Purcell as follows (54): "American agriculture at the beginning of the nineteenth century was inferior to that of England" (24, Vol. I). "The small free holder with fifty to one hundred and fifty acres could not afford to be progressive. Content with a tolerable crop which covered local demand, he was contented to scratch the top of an exhausted soil with an antiquated plow, sow home grown seed on unharrowed fields and await the harvest. Indian corn, the staple crop, was cultivated as the aborigines had taught the first settlers, fertilized by white fish or sea weed."

"Small apple orchards furnished cider apples for cider brandy," but not exclusively for brandy making. Cider itself was a common, not to say an almost universal drink

in families and some good eating apples were also grown. The housewife also made store of dried apples and apple butter for winter use. In the aggregate, "the production of butter and cheese was large." "Sheep were of a mongrel type producing little wool." "Oxen were used for heavy work on the farm and horses chiefly for driving." "Swine alone were considered up to the standard by foreign observers." "The fodder for livestock was insufficient; the lack of nourishment coupled with imperfect shelter and inattention to the principles of selection in breeding, had caused a general degeneration in practically all kinds of domestic animals." [20]

"In general the system of agriculture was not only extensive but even in many respects predatory: the farmers had little stimulus to get anything beyond a living." "The call for food supply in commercial towns can scarcely be said to have had any influence on the prosperity of the (farming) population or on farming methods in the inland region." Trade and barter were generally practiced in the inland towns, to provide certain luxuries and comforts which the farm could not supply, such as coffee, tea, sugar and—let it be whispered—rum. As to the markets for produce outside the State, there was a limited trade with the City of New York, then of 100,000 inhabitants, the southern states and the West Indies, chiefly from the river and shore towns of Connecticut. In the New York market there was competition with the Dutch settlers on Long Island and the nearby New Jersey and New York farmers. New Haven also shipped in the coasting trade cheese, pork and hams, butter, lard and cereals (8), the only vegetables being small amounts of

[20] The situation is admirably set forth in detail in P. W. Bidwell's Rural Economy in New England at the Beginning of the Nineteenth Century. (8)

beans and potatoes, most being transhipped to the West Indies. Other towns shared in this coastwise trade. The Connecticut River and Long Island Sound furnished the only convenient channels for moving the produce of Connecticut to market. But these means for carrying and trading in the products of the farm were entirely inadequate to serve the inland towns.

The public roads and highways were in wretched condition, being generally in charge of incompetent managers and inefficient workmen who were either impressed by the town or were "working out" their road tax. Cooperation between towns and counties in laying out and building highways was not always easy. In short, there was neither adequate means of transporting farm produce from the inland producers to consumers, nor any great demand for them. Connecticut had been, essentially on a circular one track business. It might have suited a literalist who could quote from the Scripture, "Having therefore food and raiment let us be therewith content."

It may not be amiss to mention two traits which have been commonly ascribed to the Connecticut Yankee and which were developed in these many years of struggle with adverse conditions. The first is a close and sometimes parsimonious economy. Of this Horace Bushnell wrote, "It was also a great point in this homespun mode of life, that it imparted what many speak of only with contempt, a closely girded habit of economy.

Harnessed all together in the producing process, young and old, male and female, from the boy that rode the plow horse to the grandmother knitting under her spectacles, they had no conception of squandering lightly what they had all been at work, thread by thread, and grain by grain to produce" (8). But along with this there was

also of necessity developed a spirit of comradeship and an exercise of mutual helpfulness in all times of need; for they were "members one of another."

Other traits ascribed to the Yankee were ingenuity and resourcefulness. In an unsettled country, without division of labor, with almost no factories, the farmer had to be his own mechanic, machinist and architect.

Inventiveness, which was at first a necessity in making tools and appliances for his own house and farm, fostered by the native mental alertment of the settler and the facilities for general education, instantly applied itself to invention and manufacturing as a separate business when the political troubles of the early nineteenth century stopped trade with the factories of the old world.

But here began a new agriculture.

In a century where the growth of knowledge of the laws of nature and the art of bringing the work of the world into co-operation with them, had been greater than in all the world's previous history, it was inevitable that agriculture, the basic industry of our people, should have made rapid advances in methods; in supplementing hand labor by machinery, reducing the man power required on the farm, facilitating transportation and trade, improving the quality of live stock and the types of cultivated plants and restoring the fertility of soils, temporarily exhausted by the rude agriculture of the previous centuries.

The course of Connecticut farming in this century may be roughly divided into four periods. First, the period of self sufficient economy, at its highest point of development in the early years of the century. Second, the period of transition to commercial agriculture — agriculture as a business — due to the development of manufacturing

and foreign trade which involved a large non-farming population.

This lasted till near the middle of the century. Third, the period in which Connecticut agriculture was greatly depressed by western and later by southern competition. Fourth, the period of abandonment of the less productive lands and the unprofitable crops and more intensive production of the very perishable farm products, fruit, vegetables, milk, etc., for consumption in adjacent cities.

Each of these periods has forced important changes in the kind of farm products raised, a resulting loss of invested capital and in some cases the abandonment of farms and the desolation of rural communities.

These changes also wrought a diversification of farming, caused by differences of soil and climate, (there is enough difference in the length of the growing season between the northern and southern counties to affect the yield of certain crops), opportunities of foreign trade, etc. Thus at nearly the same time, horse and mule breeding for the West India trade, was a paying business in the eastern part of the State, in the northwest cheese making was popular and profitable, while in New Haven and specially in Fairfield Counties more flax and flax seed were grown than in the whole of New England besides.

The history of Connecticut agriculture in this century is the history, not of the development of a single great business like cattle or wheat growing, but of raising various kinds of farm products, beef, dairying, special crops, like flax, tobacco, onions, etc., at times promoted, at other times depressed by wars, financial crises and the development of competition with other places, largely caused by

the growth of transportation facilities and cheap western lands.

In the eighteenth century, as we have noticed, trade had begun, chiefly with the West Indies, but early in the nineteenth century trade and commerce greatly expanded. The north Atlantic states were the food states. The demand for provisions, fresh, salted, pickled or dried, besides livestock and naval stores, was great and trade with the warring countries of Europe, as well as with the West Indies was very profitable — and at times very risky. The United States was the only constantly neutral country with food to sell and ships to carry it and agriculture, shipbuilding and trade greatly prospered for a time. But from about 1807 to 1916 embargos, spoliations, non-intercourse acts and war with Great Britain and all the measures of other countries to impede our manufactures and commerce, depressed farming in one direction and caused a marvellous expansion of manufacturing. Some capital had already been collected by commerce and an intelligent and energetic labor force immediately pushed the business of manufacture when European supplies were cut off and increased the demand for domestic goods which grew in volume and lessened the number of food producers.

But it did not for some time greatly concentrate population in manufacturing centers. In 1840 this State had a population of 310,015. About one-sixth of them were engaged in manufacture (not including farm produce, butter and cheese, cutting lumber, etc.)

Boots and shoes were extensively made, but no shoe factories are listed. The work was let out to be done in families. There are 2,166 "factories" listed, but their size is shown by the fact that the average number of

hands in each of the 284 textile mills was thirty. Eighty-seven different manufactures are listed and every town had a considerable number. With all these factories only 29,000 tons of coal were used, small water powers, wood and perhaps charcoal furnished the rest of the needed power. It is obvious that many of the "manufacturers" were also farmers to the extent of growing more or less of their own food (66).

The factory system of England became established in America in the second quarter of the nineteenth century and the development of manufactures on a very large scale has been since 1880 (9).

While the total population of the State was 2.2 times as large in 1920 as in 1880, the population of eight of our manufacturing towns was about 3.3 as large as it was forty years ago and includes a little over half of the population of the State. In 1880 it included about one-third.

The agencies which helped to make the art of agriculture more intelligent and productive by bringing to its aid the results of farm experience here and elsewhere were the following:

FARMERS ORGANIZATIONS. AGRICULTURAL SOCIETIES. These gatherings drew their members from the isolation of their farm life, secured social intercourse, the exchange of ideas and experience, instruction from agricultural leaders and by frequent shows and fairs promoted a healthy emulation in crop and livestock production.

The agricultural societies were not meant to be just clubs for the exchange of facts and personal farm experience, but included men of all professions who were to receive, adopt and spread the knowledge of the farming progress of all countries. This they did in the earlier

years of the century, but later their chief activity was in providing annual fairs or agricultural shows.

A "Society for Promoting Agriculture in the State of Connecticut" was formed by persons from several towns, at Wallingford, Aug. 12th. 1794 and a constitution was adopted Nov. 11th, 1794. Its members were invited to make experiments in the various departments of agriculture and the constitution of the Society contemplated the free communication of that information. Many experiments were made by the members themselves and their observation was extended to the improvements of their neighbors; the queries which were framed by the Society were distributed to stimulate a spirit of investigation and the report of useful facts to the Society, that they might be preserved for general use. Both oral and written communications to the Society were encouraged and the former committed to writing.

"This Society shall reject all doubtful or suspicious facts in communications made to the Society." The queries issued by the Society cover the whole range of farm practice.

In its Transactions, published in New Haven, in 1802, a considerable number of experiments are recorded, chiefly with fertilizers and amendments and each article is signed by the contributor. This Society was probably the fifth of its kind to be organized in the United States.

Regarding it Prof. Brewer states that it met at various places in New Haven County, but its influence extended over other parts of the State. A new constitution was adopted in 1803. A library was started in 1807. There seems to be some confusion regarding the name of the Society. In 1709 in the call for meetings it is named "The Agricultural Society of the State of Connecticut."

1809?

From 1803 to 1818 it was called "The Society for Promoting Agriculture in the State of Connecticut." But when the Society applied for incorporation the General Assembly was unwilling to grant this name, but granted the name of "The Agricultural Society of New Haven."

At first many papers were read on agricultural topics at its meetings which were quite regularly held and in 1813 it was "Resolved that a discourse be delivered before the Society at New Haven on the day following the public Commencement of Yale College, at 11 A. M. annually."

In 1819 apparently it began holding an agricultural and manufacturing show in the county. In 1820 the president of Yale College and the clergy of the county are made honorary members of the Society.

A circular issued in 1840 speaks of a "revival" of the Society and there are no records of meetings between 1822 and 1840. In 1841 the Transactions of this Society and of the New Haven Horticultural Society were printed in a pamphlet of 84 pages. The annual fairs were revived and held for a time in the town which raised the most money for the expenses of the fair. Thus in Waterbury, in 1847, there were exhibited 1,300 head of horned cattle of which 300 came from Watertown, and about 10,000 people attended the fair. In 1848 it was voted to ask the General Assembly for an appropriation for a professorship of agriculture in Yale College and Prof. J. P. Norton was asked to deliver a lecture on agriculture before the Society during the next session of the Legislature and that members of both houses be requested to attend.

The manuscript records of the Society end in 1860.

The Hartford Agricultural Society was founded and incorporated in 1817, suspended in 1831, revived in 1840,

and in that year published a pamphlet of its Proceedings. It held fairs from 1854 to 1857 and perhaps later. The Horticultural Society of New Haven, organized in 1830, incorporated in 1833, was intended to take the place of the Agricultural Society of Connecticut, then moribund, but later invigorated. The Society published reports in pamphlet form with premium lists and occasional papers. The Society still exists. Other agricultural societies were established as follows: Litchfield County, about 1839; Windham, Fairfield and Middlesex Counties in 1840. The latter led a precarious life until 1851 when it became more prosperous. Its reports were published in the Middletown papers. The Tolland County Society was established in 1853 and the New London Society in 1854. The Greenwood Agricultural Society was founded in the northern part of Litchfield County, in 1844. In the same year the Pomological Society of New Haven was established. The Hartford Horticultural Society was organized in 1849. For a time it held weekly exhibits of fruits, flowers and vegetables, from June to October.

But by the middle of the century most of these societies became dead and alive affairs, affected with sleeping sickness (18), only waking at times to make an exhibition, which was a kind of farm outing, reviving again with some vigor, under the management of some exceptionally efficient officer, then dozing again, or splitting up into smaller local groups.

But in 1852 H. A. Dyer prepared a bill which was passed, incorporating The State Agricultural Society and wrote its constitution which was adopted in June of that year. The first annual meeting was held on Jan. 11th, 1854. The aim of the Society is thus explained: "The Society seeks to disseminate a knowledge of agricultural

science among farmers by encouraging the institution of clubs in the several towns where the experience of practical men may be gathered and the theories of scientific men discussed and subjected to experiment by members.

The Society also recommends the use of elementary science books in common schools, the preparation of teachers in normal schools for instruction in these studies and gathering the products of agriculture in this State and bringing men together to enjoy an annual harvest festival." There appears to have been a federation of county agricultural societies, each of which chose a delegate to sit as a member of the executive committee. The first fair was held in New Haven in 1854 at which premiums of $3,500 were offered. Subsequent fairs of this Society were held annually in New Haven and Hartford and one at least in Bridgeport.

From 1854 till 1859 this Society printed a report of its Transactions. It is said that these publications continued till 1867, but I have not been able to find them. Besides some reports of the proceedings and fairs of the other agricultural societies, they contain notable papers on various agricultural subjects. For example, in 1855 Prof. John A. Porter offers a plan for an agricultural school. In 1856 is a paper by T. S. Gold, The Natural Flora of a District Indicates its Natural Capacity. The first of Prof. S. W. Johnson's reports on Commercial Fertilizers was published in the Transactions of 1856, followed by further reports in the two following years. In the report of 1858 he published an Essay on Peat, Muck and Commercial Fertilizers which was the basis of his book on Peat and its Uses, long the standard authority on that subject. In 1856 there is an interesting paper by H. A. Dyer on Tobacco.

Probably one result of the discussions of these agricultural societies was the testing of various old world crops and plants; lucerne, vetches, spelt, rape, poppies, madder, woad, etc., most of which were soon found to be of little or no value in this State. Alfalfa and rape still have consideration and occasional patches of alfalfa still found in headlands and fence corners, are relics of tests made long ago.

Incidentally should be mentioned the small local "Farmers Clubs" which were most numerous in the last quarter of the century and were to the neighborhood what the Agricultural Society was to the county.

The first Farmers Club of which record is found was organized in Middletown about 1842. It was to hold six meetings between October and May. "No question is to be discussed but such as shall immediately relate to agriculture."

Many of these agricultural societies still exist, but the sole purpose of most of them is to hold an agricultural fair each year, offering premiums which are paid in part by a state appropriation.

(At this writing, 1924, thirty-nine fairs have assigned dates for the present year.) The State Agricultural Society is still in existence and holds an annual show, but it has greater influence in popularizing horse racing and the attractions of a midway than in promoting agriculture. Yet in the Fifties this society was very active and became the forerunner of the State Board of Agriculture which was for a long time the single rallying point of farmers.

The Board of Agriculture. This Board was incorporated by the General Assembly at the May session

of 1866. It was made up of the Governor, one person appointed from each County by the agricultural societies which received an annual bounty from the State and four appointed by the Governor with the consent of the Senate. The Board met and organized on August 1st, 1866. The Governor was elected president, E. H. Hyde, vice-president and T. S. Gold, secretary. The Board was to investigate such subjects as it thought proper relating to improvements in agriculture and horticulture, to investigate and regulate returns of Agricultural Societies and make report on them and to inquire into the wants and methods of practical husbandry, encouraging the establishment of farmers clubs, agricultural libraries and reading rooms, and to disseminate useful information in agriculture, by means of lectures and otherwise. The first of its public meetings was held Jan. 8, 9, and 10, 1867, in New Haven.

The Board of Agriculture proved to be the organization which was most needed and most effective in promoting all agricultural interests.

Its annual meetings brought together all the leading experts in agricultural science, the leaders in agricultural practice within the State and large numbers of interested farmers. The latest work of experimenters, the wisest experience of practical farmers, discussion, and opportunity for questioning by anyone in the audience—all these things gave tremendous interest and importance to the meetings and particular value to the reports of them.

The meetings of this Board were also the birthplace of legislation in the interest of agriculture and of agricultural institutions like the Connecticut Agricultural Station, The Storrs Agricultural Station, the Storrs Agricultural School and the Connecticut Agricultural

College. All these projects were discussed in advance in the winter meetings and the opinion of the farming public obtained.

"In no other state," said Prof. Atwater "has so much been done for the application of chemistry to agriculture as has been done in Connecticut through the agency of the Board of Agriculture."

It would carry us too far to recite the subjects treated at these meetings which have been held annually, with possibly one exception, ever since. It is certain that the reports of proceedings in the earlier years are everywhere regarded as the most valuable of all similar reports and have been of the greatest help in the improvement of Connecticut farming. Especial praise is due to the service rendered by T. S. Gold, the secretary of the Board during a long series of years, for his most wise and efficient management of the meetings.

The Board was abolished by resolution of the General Assembly on July 21st, 1870, but in 1871 The State Board of Agriculture was again incorporated by the same body. The new act of incorporation is quite like the old except that wider powers were conferred on the board.

The Board could quarantine animals having infectious diseases, enter premises where such diseases were present or suspected and make necessary regulations to prevent a spread of the disease and to appoint three commissioners on diseases of domestic animals and delegate to them the powers of the Board. The Board elected besides a president, vice-president, secretary and treasurer, a veterinary surgeon, entomologist, botanist and chemist. Thus constituted, the Board continued to be active in providing for discussions of agricultural improvement and for information both from scientific experts and from leaders

in agricultural practice. In 1897 the Assembly reorganized the Board, providing that its eight members should be appointed by the Assembly, one from each county, rather than as before, by the agricultural societies of the State.

Two offshoots of the Board have had a very vigorous and helpful life: On April 10th, 1889, was incorporated the Connecticut Dairymen's Association. A brief report of its meeting in January, 1892, 25 pages, states that this is the eleventh annual meeting.

It then had 45 life members and 43 annual members. It must therefore have been in existence for eight years before its incorporation.

It has yearly held a general meeting of dairymen and has published valuable annual reports. It has also held dairy institutes and farm meetings about the State. In 1900 it had 99 life members and 69 annual members.

The Board of Agriculture had a pomologist and at its annual meetings were many discussions of interest to orchardists; but as fruit growing increased in importance within the State, the growers desired more opportunity for discussion and promotion of their interests.

A convention of fruit growers, called in 1891, organized the Connecticut Pomological Society. This Society, which in 1923 numbered 483 members, has for many years held annual meetings with fruit exhibits which are largely attended, frequent field meetings during the summers and farm institutes in all parts of the State. It has been the chief agency in promoting the interests of fruit growers.

The Cream Hill Agricultural School. The usefulness of technical schools of agriculture was anticipated long before their establishment. A debate in Yale Col-

lege in 1789 is noted on the question: "Whether it would be best to introduce agriculture into colleges as a classical study?"

In 1832 an effort was made to establish The Litchfield Agricultural High School and the corporation of Goshen Academy was asked to turn over the Academy to the promoters of the scheme, but they were refused and the plan failed (29). In 1842 the Connecticut Farmers Gazette announced that Rev. J. B. Noble proposes soon to open an agricultural institute in Bridgeport. No further notice of it has been found.

Three years later, in 1845, The Cream Hill Agricultural School was established at West Cornwall and conducted by Dr. S. L. Gold, for years the principal physician in Goshen, who had recently removed to his farm in West Cornwall, and his son, Theodore S. Gold, (Yale, 1838), who, throughout his long life was an inspiring leader in the promotion of Connecticut agriculture. The prospectus of the school is in part:

"The plan of this institution is to receive a select and limited number of pupils, under the superintendence of well qualified teachers, to be fitted for college, or any of the useful pursuits of life.

"This school embraces two important departments of instruction. First: Thorough attention to the various elementary and scientific branches taught at the best academic institutions. Second: Both scientific and practical instructions in Agriculture and Horticulture, embracing the most approved method of tillage, rearing of stock, cultivation of trees, the laying out of grounds, ornamental gardening, chemical analysis of soils, composts, etc. A portion of each day will be allotted to these subjects, so that the pupil may become a scientific and prac-

tical farmer. The farm, containing 200 acres, with convenient buildings, situated on Cream Hill, surrounded by a picturesque country scenery, furnishes a location unrivalled for healthfulness and freedom from immoral tendencies and peculiarly fitted for such an institution.

"The Housatonic railroad furnishes daily access to New York. The students will become members of the family of the instructors. A parental supervision will at all times be exercised over each individual.

"All will be treated with kindness and every attention rendered, with affectionate regard to health, deportment and morals.

"The institution will be conducted by Samuel L. Gold, Theodore S. Gold and Thomas R. Dutton. There will be two terms in each year; the first commencing the first Wednesday in May, and terminating the first Wednesday in November; the second from the first Wednesday in December to the first Wednesday in April.

"Terms: The pupils will be furnished with tuition, board, fuel, lights, washing, privileges of the library and riding, at $200 a year, one-half to be paid at the beginning of each term.

"West Cornwall, Conn. March 31, 1845."

In all, 272 pupils attended this school from its opening in 1845 until it was closed in 1869 on account of the pressure of other business. It opened with ten pupils. After that the number ranged from twelve to thirty-one, an average of more than twenty-two, probably all that the accommodations would permit.[21]

[21] Prof. George J. Brush was one of the earliest students. He planned to enter a commercial establishment in New York City but here acquired an interest in chemistry and particularly in mineralogy the pursuit of which became his lifework until overshadowed by his administrative work as Director of the Sheffield Scientific School and the Agricultural College of the state.

From the catalogue of 1849 we learn "Each pupil cultivates a garden of about 130 square yards; is instructed in laying out, planting and the application of manures. Small premiums are awarded for the best gardens. Ample opportunity is afforded each to acquire a knowledge of general farming, tending and rearing the various kinds of stock, etc."

There is nothing in the catalogues to show any list of teachers.

Mr. Dutton dropped out soon after the school was established and most, if not all, instruction was given by Dr. Gold and his son.

The Storrs Agricultural School. In January, 1881 Messrs. Augustus and Charles Storrs offered to the State 180 acres of land and various buildings in the town of Mansfield for the purpose of establishing and maintaining an agricultural school. The buildings had been used previously as a home and school for the orphans of soldiers in the Civil War. The offer was accepted and the Storrs School was established.

Its object, as set forth in the act of establishment, was "The education of boys . . . in such branches of scientific knowledge as shall tend to increase their proficiency in the business of agriculture."

A part of their time was to be spent in classroom work and a part in the practical work of the farm. The school continued for twelve years with fair success. During this time its attendance ranged from 40 to 63. In 1893, by act of the Assembly, its purpose was changed and it was renamed The Storrs Agricultural College.

The Agricultural and Mechanical College of Connecticut. In 1840 Justus von Liebig issued his

work on Chemistry in its Relations to Agriculture which started a great agricultural revolution and drew the attention of chemists throughout the world to the problems of plant production.

Between 1840 and 1850 Prof. Silliman at Yale gave instruction in these matters. In 1846 John P. Norton, the son of a Connecticut farmer, after training as a farmer and some years of study at Yale and at Boston and later in Scotland, (where he won a prize of fifty sovereigns, given by the Highland Society of Scotland for the best essay on the oat plant), opened a laboratory at Yale in connection with Silliman "for the purpose of practical instruction in the applications of science to the arts and agriculture."

This was the beginning of the Sheffield Scientific School which first gave the degree of Ph. B. in 1851. Here Prof. Johnson studied and began the analysis of commercial fertilizers and detection of frauds in their sale, and for many years this was the only place connected with any college in America where that means of protecting farmers was systematically followed.

Norton, whose work was cut short by tuberculosis, was succeeded by Prof. John A. Porter.

In the meantime Joseph E. Sheffield made a gift of $50,000 for the endowment of the School and during the rest of his life gave from ten thousand to twenty thousand dollars yearly to its support and made it as one of his children in the final division of his estate. In all he must have given more than a million dollars to its support.

Under the management of Prof. Norton there was given the first course of Yale Agricultural Lectures.

The views in which this course originated are given by which began Feb. 1, 1860, and closed Feb. 25.

Prof. Porter as follows: The importance of new agencies for the diffusion of agricultural knowledge is emphasized.

"Shall we wait for the establishment by government of great agricultural institutions, similar to those in Europe? Such institutions are the most obvious and essential wants of our times, but a public and general opinion of their utility and necessity must be created before either our state or national governments will seriously consider their establishment."

Porter proposes "the enlistment of practical men, who are not professional teachers, in the work of instruction and their combination in such numbers, that a small contribution of time and labor from each shall make a sufficient aggregate to meet the object in view."

The experiment was made under the auspices of the Yale Scientific School. At this course of lectures about 350 students were registered and some 500 in attendance; 172 from Connecticut, 23 from Massachusetts, 35 from New York and a smaller number from 13 other states.

Three lectures were given daily, morning, afternoon and evening. The subjects and lectures were:

Agricultural Chemistry	Prof. S. W. Johnson
Entomology	Dr. Asa Fitch of New York
Vegetable Physiology	Daniel C. Eaton
Vegetable Pathology	Chauncey E. Goodrich
Pear Culture	Marshall P. Wilder
Grapes	Dr. C. W. Grant
Berries	R. G. Pardee
Fruit Trees	P. Barry
Fruits	Lewis F. Allen
Arboriculture	Geo. B. Emerson
The Honey Bee	Mr. Quimby
Drainage	Henry F. French
Grasses	John S. Gould
Agricultural Associations	Mason C. Weld

Cereals	Joseph Harris
Root Crops	T. S. Gold
Tobacco and Hops	W. H. Brewer
Sandy Soils	Levi Bartlett
English Agriculture	L. H. Tucker
Profits of American Farming	Josiah Quincy, Jr.
Cattle	Cassius M. Clay
Stock Breeding in the United States	Lewis F. Allen
The Dairy	Charles L. Flint
Horses	Sanford Howard
Breeding and Training Horses	Dr. D. F. Gulliver
Sheep	T. S. Gold

The course proved to be very popular and stimulated the desire for regular courses of agricultural instruction. "Mr. Barry whitling at his pear tree before the audience is worth a whole treatise on grafting and pruning. Mr. Gold's discourse on sheep, interspersed with the bleating of his Cotswolds and punctuated with the black noses of his Southdowns, is worth a volume on mutton and wool."[22]

This Institute was not continued. In the next year the outbreak of the Civil War made it seem unwise at that time and the establishment of the Agricultural College later made it less needed. But there is much evidence that greatly increased interest in scientific agriculture immediately followed. "In concluding, Mason Weld strongly advocated the establishment at once of an agricultural farm in connection with a thoroughly furnished laboratory, referring to the debt the world owes Lawes and Gilbert for their experiments at Rothamstead and to the weighty results developed by the investigations in France and Germany which latter country has now in operation more than forty experiment stations under the

[22] Brief abstracts of these lectures are given in the New England Homestead for the year 1860.

management of competent men of science in connection with practical farmers."

Two years later the Morrill Act was passed by Congress which provided for the establishment of an Agricultural College in every state.

By this act a grant of public land was made to each state for "the endowment, support and maintenance of at least one college where the leading object shall be, without excluding other scientific and classical studies, and including military tactics, to teach such branches of learning as are related to agriculture and the mechanic arts in such manner as the legislatures of the states may respectively prescribe in order to promote the liberal and practical education of the industrial classes in the several pursuits and professions of life."

The yearly grant to Connecticut yielded an income of only six or seven thousand dollars — a rather scanty sum for the establishment of an institution which should meet the requirements of the act.

Yale College was the only institution which was at all capable of using the grant. It was already equipped for such work and was giving instruction in all the branches of study required under the act except in military tactics. The state having accepted the grant, in 1863 gave the income to the Yale corporation to be devoted to the support of the Sheffield Scientific School for the maintenance of such instruction as shall carry out the intent of Congress.

The School was to furnish gratuitous tuition to such a number of pupils that their tuition, charged at the usual rate, would equal one-half of the income of the fund. The award of these scholarships was made by a committee, whose appointment was provided in the act.

The State made a perpetual contract with Yale College and established it as the Agricultural and Mechanical College of the State, but contributed nothing more to its support. The government fund was, however, supplemented by generous gifts from Joseph E. Sheffield as has been noted on a previous page. In 1890 Congress passed an act for the more complete endowment of the Agricultural Colleges by which they eventually received an additional sum of $25,000 annually. At this time there were eighty students in the Sheffield School on the agricultural scholarships.

As soon as this appropriation was made, various colleges of agriculture and the mechanic arts were bitterly attacked on the ground that they were not fulfilling the object of their existence and were maintaining colleges of too high grade and unsuitable requirements for the sons of farmers. As a consequence of this movement the General Assembly in 1893 transferred the government fund to the Storrs Agricultural School in the town of Mansfield, at the same time changing its name to the Storrs Agricultural College.

A commission appointed to decide on the nature of the contract between the State and the Sheffield School awarded the latter $154,000 damages on account of the violation of the perpetual contract by the State. The Storrs Agricultural College had at this time an enrollment of about one hundred students and its courses were officially opened to women. In 1889 the name of the institution was changed to the Connecticut Agricultural College.

The College now has an attendance in all departments of 484. Its activities fall into three divisions; the Resi-

dent Instruction, the Storrs Agricultural Station and the Extension Service which are noticed later.

The Resident Instruction offers:

1. A four year course in Agriculture leading to the bachelor's degree. Graduates of high schools, accredited by the State Board of Education are entitled to enter this course.

2. A four year course in Home Economics, for young women, leading to the bachelor's degree. Open to graduates of high schools as above.

3. A two year course in Agriculture, divided into four ten-week terms. Open to those who have had a common school education. Those completing the four terms' work are given a diploma.

4. A summer school in Home Economics for those who desire teacher training in that subject.

5. Short course in Agriculture is given to men and women of the State who can be away from home duties for a short time only.

Agricultural Extension Work — County Farm Bureaus

On May 8, 1914 a national system of co-operative extension work in agriculture and home economics was provided by the so-called Smith-Lever bill. By it Congress appropriated $480,000, providing an annual increase for eight years until the total sum annually appropriated reached $4,580,000. Congress has since appropriated an additional $1,300,000 for the same purpose as the Smith-Lever fund and a further appropriation of about $1,300,000 for co-operative demonstration work.

In order to secure Federal Smith-Lever funds, the

several states must appropriate an equal amount for the support of extension work.

These funds are divided between the states on a basis of their rural population. Under these several acts Connecticut receives $68,950.09 from Federal funds which is supplemented by appropriations from the State amounting at this date to $75,000 annually.

The Extension Service is, therefore, part of a national system of agricultural education established by Federal laws. It is a division of the Agricultural College which is carrying information and instruction in improved methods of farming and home making to the people of the State, through demonstrations, meetings, letters, news stories, campaigns, field trips and farm and home visits. Further than this it is the work of the extension service to interest farmers and home makers in putting these improved methods into practice. It is concerned as much with assisting in solving the problems of marketing as it is with solving the problems of production.

The extension work is carried on by a staff of men and women. Some of these are specialists in the various branches of agriculture and home making, such as dairying, fruit growing, poultry raising, nutrition, clothing, etc., who work throughout the State and have headquarters at Storrs. The other extension workers are county representatives of the Extension Service and are known as County Agents, doing work in agriculture with adults; Home Demonstration Agents, working with women on home problems; and County Club Agents, the latter carrying work with boys and girls, commonly known as club work.

Practically all the work is carried out in conjunction with the county workers. The Extension service reaches

the entire family; men, women, boys and girls. The specialist studies the industry which he represents, in order to learn its problems and recommends the improvements which should be encouraged and the methods which should be used in extension teaching. Co-operating with the Extension Service are the County Farm Bureaus in each county, supported by membership fees, voluntary contributions and when these amount to $1,000, by grants from the college and State. In 1921 seven Farm Bureaus formed a state federation and through it joined the American Farm Bureau Federation, a national organization, maintaining a representative in Washington and interesting itself in legislative questions which affect the farming interests.

The Connecticut Agricultural Experiment Station. The object in establishing this station was to apply the methods of scientific research in solving those problems of the farm which needed the time, equipment and technical knowledge which the farmer himself could not supply.

Connecticut was the first State to establish such a station after many years of effort to convince the public of the need.

The demonstration which Connecticut made of its value quickly induced other states to create similar stations and now they are found in every state, territory and insular possession of the United States.

A brief notice of the development of the idea for twenty years from the early fifties is interesting. In 1853 and the following years, articles by Prof. S. W. Johnson of the Sheffield Scientific School, published in the Country Gentleman, discussed the contributions of science to agri-

culture, the feeding of farm animals, food for plants, superphosphate of lime, etc., calling attention to the applications of science to agriculture and perhaps for the first time in this country, to the quality of commercial fertilizers. Such fertilizers were then, for the first time coming into common use, extravagant claims for their virtues were often made and no knowledge of their composition given; there was danger of too much faith in their virtues and too little knowledge of their proper use. In 1856 Johnson's exposures of fraud in fertilizers led to his appointment as chemist of the Connecticut Agricultural Society and the continuance of his work on that subject.

A lecture on "The Relations which Exist between Science and Agriculture," delivered in Albany, in 1856 and published in the Transactions of the New York State Agricultural Society, excited wide interest and discussion. There followed almost twenty years of preaching and teaching by Johnson on the need of applying to the art of agriculture the teachings of natural science. His laboratory work as chemist of the State Board of Agriculture and the publication of its results in the annual reports stirred the desire of farmers to enlist the aid of research in the every day work of the farm.

Important in this educational work were his two books, How Crops Grow. A Treatise on the Chemical Composition, Structure and Life of the Plant, for all Students of Agriculture; published in 1868, and How Crops Feed, A Treatise on the Atmosphere and the Soil as Related to the Nutrition of Agricultural Plants, published in 1870. His object, as stated by himself, was "to digest the cumbrous mass of evidence in which the truths of vegetable nutrition lie buried out of the reach of the ordinary in-

quirer and to set them forth in proper order and in plain dress for their legitimate and sober uses."

At the instance of von Liebig the book was translated into German by his son. It was reprinted in England, translated into Italian, Russian, Swedish and Japanese for use as a textbook in those countries.

Two Connecticut men, Jared Eliot in the eighteenth and S. W. Johnson in the nineteenth century wrote books on scientific agriculture, which probably had the widest influence on farming in America of any during this period.

In 1873 Prof. W. O. Atwater of Wesleyan University, a former pupil and assistant of Johnson's, joined in urging the establishment in the State of an Agricultural Experiment Station and in their addresses before the Board of Agriculture and frequent gatherings of farmers through the State emphasized the advantage and need of applying to the art of farming the teachings of natural science and the wisdom of providing an agency whereby the problems of the farm, which the farmer had neither the time, the facilities, or the expert knowledge to solve for himself, could be studied and possibly solved by experts in an institution specially fitted for this purpose.

In 1874 the Board of Agriculture, at the recommendation of a committee through its chairman, Prof. Johnson appointed a permanent committee to urge on farmers and the Legislature the immediate establishment of an agricultural station. Later this committee reported that a bill for this purpose had been introduced into the General Assembly, held by the committee of the Assembly till near the close of the session and then reported, recommending that it be laid over to the next session.

Again in the Assembly of 1875 the attempt was made unsuccessfully.

But Mr. Orange Judd, an agricultural editor and a trustee of Wesleyan University, urged the formation of an association to provide money for an agricultural station by private subscription, a plan which was contrary to the wishes of the committee of the Board of Agriculture. He however, secured the passage of the following resolution in the spring of 1875, thus establishing in Connecticut the first Agricultural Experiment Station in America.

To Promote Agricultural Interests

Whereas, The trustees of the university at Middletown tender the free use of laboratories and other facilities for establishing and carrying on an experiment station for the general benefit and improvement of agriculture and kindred interests of the State of Connecticut, be it

Resolved by this Assembly, That the sum of seven hundred dollars per quarter for two years, is hereby appropriated to the University located at Middletown, Middlesex County, to be used in employing competent scientific men to carry on the work appropriate to an agricultural station.

In addition to this appropriation Mr. Judd subscribed one thousand dollars. A very full and admirable account of the whole movement is given in "From the Letter Files of S. W. Johnson," edited by his daughter, Elizabeth A. Osborne.

This station was under the exclusive control of the trustees of Wesleyan University and an impression,

founded upon Mr. Judd's utterances and personal attitude was widespread that the purpose of this station was for the analysis of commercial fertilizers alone. Such however, was not at all the position of Prof. Atwater, who was chosen as its director. In his first report he says: "It has been felt from the first that more abstract scientific investigation would afford not only the proper, but also the most widely and permanently useful work of an agricultural station. Such an institution will be worthy of the name in proportion as it carries on accurate and thorough investigation and experiment in agricultural science."

But to prove to the farming public the present need of an agricultural station and thus to secure for it a firmer and more liberal basis, stress was first laid on the situation of the fertilizer trade — a continuation of Johnson's work — in which there was "bitter need" of a better condition. In the two following years a large part of the station time was devoted to the examination of fertilizers. Some examinations of dairy feed were also made, the testing of agricultural seeds, effects of nitrogenous fertilizers on the growth of corn, a study of the fertilizer needs of the soil of the Wallingford plains, etc.

A prominent feature of the station work was co-operative experiments with fertilizers on lands in different parts of the State and later, under Prof. Atwater's directions, in several other States, the results of which were printed in the reports of the State Board of Agriculture, from 1877 to 1881. Thus a new agency for the advance of agriculture was founded and the example was speedily followed by some other States.

Five, at least of Prof. Atwater's assistants in this work soon became workers and leaders in other places; W. Bal-

lentine, Professor of Agriculture in the Maine Agricultural College; E. H. Jenkins, chemist and later director of the Connecticut station; W. H. Jordan, director of the Maine and then for many years director of the New York, (Geneva) station; A. T. Neale, director of the New Jersey and later of the Delaware station and C. D. Woods, director of the Maine station.

Before the appropriation for the station had expired the General Assembly passed "An Act Establishing the Connecticut Agricultural Experiment Station," "for the purpose of promoting agriculture by scientific investigation and experiment," and granted $5,000 annually to its support. In its organization this station differs from all others. Besides having no organic connection with any agricultural College it is an independent unit having most of the rights of a corporation, with power to sue and be sued, to receive gifts and to hold property. It is managed by a Board of Control, consisting of the Governor, two appointed by the Governor and one each by the State Board of Agriculture, the State Agricultural Society, Wesleyan University and the Sheffield Scientific School. The director is *ex officio* a member. Prof. Johnson was chosen director and the station was placed at New Haven. As it was not possible to secure permanent quarters from the fund appropriated, the Sheffield Scientific School gave the free use of laboratory and office room until 1882 when the State provided land and buildings which the station has occupied ever since. In 1887 the first Federal aid was given to the stations of the United States by the Hatch Act which ultimately provided $15,000 to each state to be by the state paid to such institution as it might designate, the "object and duty of the station" being to conduct original researches or verify experiments on the

physiology of animals and plants. The General Assembly gave one-half of this fund to the Connecticut Station and half to the newly established Storrs Agricultural Station to be noticed later.

In 1896, by the Adams Act of Congress, $15,000 additional was given to each state and this sum was likewise equally divided between the two Connecticut stations.

This appropriation was to be used only for pure research work, a restriction which has greatly helped the more fundamental work of all the stations. The appropriations by the State to the Connecticut station gradually increased as the scope of its work and the demands made upon it have grown. A very brief notice of some of its labors should here be given to indicate the scope and nature of it.

It taught and proved by field trials the value of spraying for the protection of field crops and orchards from fungi and insects.

It has studied the life history of each new insect and fungus pest as it has appeared and the best methods of fighting it; the San Jose scale, the gypsy moth, the pine blister rust, the elm leaf beetle, etc.

It has directed the work of mosquito elimination and accomplished much with the insufficient means at its disposal.

By its inspection and reports it has exposed the frauds in food and fertilizers and drove most of them out of the State before the Federal Government undertook any of that work.

As a part of that work it has examined all the special foods made and recommended for diabetic patients and the reports on them are the standard reference for specialists in the treatment of this disease.

The long continued and fruitful researches of Dr. Osborne have identified and showed the ultimate and structural composition and properties of the principal vegetable proteins.

An inquiry into their relative nutritive value has led to extensive studies in nutrition, has perfected a new and most fruitful method of experiment in this field, has led to the discovery of vitamines and studies of their function and to medical studies on the cause of rickets, infertility, etc.

The study of plant breeding here has shown the futility of certain recommended methods of inbreeding and selection and by methods first adopted here has produced new and improved strains of corn and tobacco and has demonstrated methods of developing superior strains of field crops which have secured general recognition.

It substituted for the very unfair method of payment of cream by the space, the Babcock method of determining and paying for butter fat only, by adapting it for cream gathering creameries and proving its value.

It made, at the request of dairymen, a comparison of economy between the gravity and the separator systems of raising cream for butter making creameries.

It introduced into the State the successful growing of shade tobacco and the method of fermentation in bulk and by its very elaborate field tests with fertilizers has greatly advanced the tobacco growing industry in the State.

The station established an experimental forest for the study of forest problems, aided in the planting of private and corporation forests, besides giving advice by addresses and field demonstrations in the management of the farmer's wood lot.

These illustrations, by no means a summary, give some idea of the range of the station's work and show how it has gradually become a public service agency. While designed solely for the benefit of agriculture and while its main effort is directed to that end, circumstances have drawn it in several directions into the service of the whole community.

The station has also from its staff, furnished teachers and research men to other states and institutions. Some of them are:

H. P. Armsby, Professor of Agricultural Chemistry in the University of Wisconsin, Director of the Pennsylvania Station and later Director of the Pennsylvania Bureau of Animal Nutrition.

E. M. East, Professor of Genetics in Harvard University.

W. Mulford, Professor of Forestry, University of California.

S. W. Spring, Professor of Forestry, Cornell University.

R. Thaxter, Professor of Cryptogamic Botany, Harvard University.

H. L. Wells, Professor of Analytical Chemistry, Yale University.

E. H. Farrington, Professor of Dairy Husbandry, Wisconsin Agricultural College.

The Storrs Agricultural Experiment Station. In accepting the provisions of the Federal Hatch Act the General Assembly provided that "the farm attached to the Storrs Agricultural School may be used as an experimental farm for the purposes specified" in the Federal act and also provided that one-half of the Federal ap-

propriation which came to the State should be used by the trustees of the school under the provisions of the act.

Prof. W. O. Atwater was chosen director and during the eighteen years of his service, the field and farm work of the station was done at the Storrs Agricultural School and the more purely scientific investigations were carried on in the laboratories of Wesleyan University. In 1903 the station was reorganized and its office was removed to Storrs where a small building was erected for its use. Prof. Atwater resigned his office and Prof. L. A. Clinton became his successor.

Perhaps the most striking work of this station up to this time was that of Atwater and Woods which proved the assimilation of free nitrogen by leguminous crops. It is believed that this work, done in 1881 and 1882 supplied, by convincing evidence, the first proof of this function of the legumes. It was reported briefly at the meeting of the American Association for the Advancement of Science in 1881 and at the meetings of the American and British Associations in 1882, and in detail in the American Chemical Journal in 1885. Before the latter date the more elaborate work of European investigators on the same subject was published in scientific journals.

The studies on the composition and value of foods for human populations on which Atwater was engaged in 1877, the introduction of the bomb calorimeter about 1890, of a respiration calorimeter in 1896, studies of dietaries with determination of energy values, digestion experiments with animals, (1896), mark the beginning in this country of the studies of foods and the food requirements of populations which now fill a large place in the public regard and found a very special value in the world war. Much of this work, reported in the publications of

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the Storrs station was done with funds contributed by various outside institutions and individuals. It was not until 1895 that the State appropriated $1,800 yearly for studies of food economy and the bacteria of milk.

The studies of bacteria in relation to dairy practice, began at the station in 1888 by Dr. H. W. Conn and carried on by him and his assistants into the next century, and the introduction of the covered milk pail have been of great educational value to the dairymen and the public and have laid the foundation of the improvement in the sanitary quality of milk produced and sold in this State.

The nutrition studies of the station were discontinued with the removal to Storrs, but the bacterial studies on dairy products were continued.

The field tests of fertilizers in all parts of the State, begun in 1875 were continued until into the next century.

Of importance was also an extensive study of the composition and fertilizer value of the roots and stubble of crops.

The work in poultry, intensively carried on soon after 1900, has determined the nature and cause of bacillary diarrhoea in poultry and shown the effective means for combating it.

The use of pigmentation and other criteria for selecting laying hens has resulted in extensive rejection of unprofitable birds and consequent reduction of the cost of egg production.

The studies of the factors affecting artificial incubation, of the egg production of different breeds, and of the means of controlling parasites of poultry, have all contributed much to the profit of poultry raising.

The studies of infectious abortion, still in progress,

have already thrown much light on this obscure and very destructive disease.

A comparative test of the yield of the chief varieties of corn grown in the State, made in co-operation with the Connecticut station, and continued for nine years has indicated which varieties are on the average the most productive and which are best adapted to the different sections of the State.

This statement is made merely to give an impression but no complete statement of the range of the station's work.

Among those who have been on the station staff and have since served important agricultural interests may be mentioned, W. A. Stocking, Jr., now professor of dairy bacteriology in Cornell University; Dr. Charles Thom, for years assigned to the station as mycologist by the U. S. Department of Agriculture, who was later chief mycologist of that Department; Dr. H. W. Conn, bacteriologist, a professor at Wesleyan University, chief of the State Board of Health laboratory and a leading dairy bacteriologist; C. L. Beach, formerly professor of dairy husbandry at the station, then at the University of Vermont and now president of the Connecticut Agricultural College.

The Grange of the Patrons of Husbandry is an agency which has helped to increase agricultural knowledge in less formal ways than those already cited as well as to promote social intercourse among farmers.

The National Grange of the Patrons of Husbandry was organized Dec. 4, 1867. The founders "looked for advantages to come to the farmers through social and intellectual intercourse, not through political action."

The first local grange was organized in Washington,

D. C., its members being largely government clerks and employees. It was a weak organization until 1871 but the panic of 1873 which fell on farmers with great severity, greatly increased the grange activity and led to the wild "granger" legislation at the west. In that year granges were formed in all but four states, of which Connecticut was one. The organization was at its maximum in 1875 when the membership was probably over one million, but interest declined till in 1880 there were only 4,000 active.

The State grange in Connecticut was organized, April 15, 1875 but was not successful till about 1885 when a new State grange was organized at South Glastonbury. In that year there were sixteen granges in the State. But the order grew rapidly. In 1892 there were eight Pomona granges, 146 subordinate granges with 10,000 members. From about that time the numbers decreased. Of 155 granges organized in Connecticut since the beginning twenty per cent have died.

The grange in Connecticut has never been very successful as a co-operative agency in marketing, nor has it assumed political activity as a distinct party element. It has been of very considerable value, however, in the way contemplated by the founders noted above. It has promoted social intercourse, mental improvement and exercise in public speaking and writing.

It has drawn many from the isolation of their farms into intercourse with a wider social circle, before the days of improved roads, automobiles and by them the possibility of sharing in the attractions of the city, lessened the popularity and the need of the grange.

The Development of Agricultural Tools

"The nineteenth century witnessed greater improvements in agricultural methods and machinery than any —if not all—the centuries that had gone before." At its beginning all agricultural tools were of the rudest kind, designed almost wholly for hand labor and either made on the farm with the aid of the blacksmith or of some local carpenter. No two were exactly alike.

Thus up to 1790 wheat was sown by hand, cut with a sickle, thrashed and winnowed by hand (66). The cradle scythe was in common use before the beginning of the century and Brewer states that between the time of the declaration of independence and the introduction of the cast iron plow, some fifty years later, the most important improvements in agricultural machinery were the American cradle and the fanning mill for cleaning grain and other seeds.

The plow was a very clumsy affair, with a mould board hewn from wood, protected from wear by old scraps of sheet iron or tin nailed to it.

The share was generally of iron with a hardened point. The beam was a straight stick with upright handles cut from branches of trees.

A powerful man was needed to hold it and twice the draft required for a modern plow. Ex-president Jefferson first laid down the mathematical principles by which mould boards could be made by anyone with the certainty of all being effective and alike. His ideas were put in practice about 1793. Charles Newbold of New Jersey made the first cast-iron plow in the country, all cast in one piece, which was patented in 1797.

But for a long time a farm tradition, which seems to

have been imported from England, that the iron plow "kills the life of the land" hindered its general use. Corn land was thought to be specially injured by it and wooden plows were used by some farmers for plowing corn land, long after they were discarded for other uses.

"This ol' motor plow," said Kipling's bailiff not long ago, "may be all right in Ameriky, but it don't turn the earth not a spit deep — 'taint no good for the honor of the land." These traditions, foolish as they may seem, are yet signs of that care, love and almost reverence for the soil, "The honor of the soil," which was ingrained in our English forbears and happily runs in some measure in the blood of their descendants and which is now leading the most progressive back to more careful study of the nature of the soil itself and the methods of caring for it. For soil is seen to be not the dull, dead thing so many imagine but teeming with life. It largely determines the kind of crops which can be successfully raised in any region. While permanent exhaustion of soil is rare, an understanding of its nature, of the life within it and the sanitation of this life are necessary if agriculture is to meet the demands now made upon it.

The cast-iron plow was rarely used before 1820. The Hawkes plow made in Hartford, became popular between 1830 and 1833 and at that time "everybody had them." Fairbanks of St. Johnsbury also made iron plows in 1826 and their use spread rapidly down the Connecticut valley.

The cast-iron plow was much improved by Joel Nourse and his partners in Massachusetts in 1836 and was in great demand in the twenty years following. It is stated that 20,000 plows were sold by them in a single year. The number of patents on plows prior to 1830 was 124, up to 1848 between 300 and 400.

Apparently the steel and wrought-iron plow was patented in 1808, a side hill plow in 1831, the coulter attachment in 1834, jointer in 1884, and probably the wheel, gang and steam plow somewhat earlier.

The sulky plow was in use in 1844. The steam tractor plow was invented and used some time in the sixties. Threshing machines were introduced early in the nineteenth century.

There are various contestants for the honor of inventing the grain reaper but the record of the McCormick reaper will sufficiently indicate the time of the introduction of this labor-saving machine which has made possible the enormous expansion of wheat growing.

The invention began in 1809. It was not then a success though it had the main features vital to all grain cutting machines. Between 1820 and 1830 the machine was made serviceable and was patented in 1834. A number were made prior to 1844. In that year twenty-five were built, double that number in 1845 and the next year a yet larger number. From 1845 to 1860 the model remained unchanged except for the addition of seats for the raker and driver. The machine cut the grain and left it on the ground in loose bundles. The self-binder was added in 1872 using wire binders. In 1880 twine was substituted.

A successful mowing machine was patented in 1822 by Jeremiah Bailey of Pennsylvania, which "cut grass in the neatest manner, where land was smooth, with a swath about five feet wide and lays the grass in regular rows." But the foundation of the present mower rests on the patent of Hussey in 1833. Subsequent changes have been improvements of his idea. Mowers were not in general use before 1850.

The period of the invention of other farming tools now in use in greatly improved form was apparently in the three decades following 1830. The horse cultivator was devised by Jethro Tull of England early in the eighteenth century and of a drill seeder in 1733.

Jared Eliot's seeder and manure distributor has already been noted, (page 344). The first patent for a corn planter was granted to Eliakim Spooner of Vermont, in 1799. The first potato digger was invented about 1833.

The Connecticut Courant, July 31, 1821, announces "a machine for sowing small seeds with perfect regularity and in any desired quantity has lately been invented." But the manufacture of grain drills began about 1840.

At the beginning of the century farm wagons were almost unknown, two-wheeled carts being more convenient with oxen. Chaises and coaches then began to be used for travel. Light, one-horse wagons came into use about 1830.

Commercial Fertilizers. Until the middle of the century the fertilizers used in the State other than farm manure were lime in various forms, land plaster, swamp muck and marine mud and on the coast farms, fish, following the Indian practice. But soon after 1840, following the appearance of von Liebig's work on Chemistry in Its Applications to Agriculture, attention began to be called to concentrated or commercial fertilizers.

Probably Peruvian guano was the first used. Then the business of fertilizer manufacture began and chemical manures "as good as Peruvian guano" were put on the market. In 1856 the manufacture of dry fish manures began. The opening of mines of phosphate rock in South Carolina and later in Florida and development of the German potash industry early in the Sixties furnished the

material for an extensive use of soluble phosphates and potash salts. The concentration of beef slaughtering for the market in great establishments made necessary and profitable the reduction of offal to an inoffensive and transportable form, which at once found its use in nitrogenous manures. Nitrate of soda from Chili was also an important addition to the fertilizer material and in recent years the recovery of ammonia from the coke manufacture and the fixation of atmospheric nitrogen have further added to it.

In the early years some were sceptical or denied the value of commercial fertilizers and others had often too much faith in them, as a kind of patent medicine, to cure all defects of soil or tillage. The proper regulation of the trade and the protection from frauds, as is noted on page 378 became very necessary and was a chief reason, in the minds of many farmers, for the establishment of an agricultural station. A law was passed in 1869 requiring the labeling of commercial fertilizers with a statement of composition. But with time the manufacture of fertilizers has become as reliable as any other kind of manufacture, the goods are sold largely on the basis of their content of plant food and farmers have come to a better understanding of the way in which they should be used. At the present time 60,000 to 70,000 tons yearly are used in the State, for which farmers pay probably not less than five million dollars; by the census of 1919 about $4,900,000. Calculating the amounts paid on the value of the dollar in 1913, the increase in the amount paid yearly for fertilizers is the last decade has been about $360,000.

The foregoing shows the development of the educational and material aids to agriculture which were forced

by the increasing demands made upon it by the growth of population and the increasing diversity of employment.

It remains to notice the more important farming interests which have from time to time flourished in the last and the present centuries.

At no time have there been such large farms as in many other states.

Never has Connecticut been a one-crop State. In each period there have been a number of farming interests which were moderately profitable and at the same time others which were growing or decreasing in importance.

Horses and Mules. In the last century horses had been exported from Connecticut to the West Indies and the business was of considerable importance after the close of the Revolution and into the early years of the new century. The following, (43, 1855), from a correspondent in Coventry illustrates the conditions:

"From the settlement to the close of the revolution horses were of medium size, mostly pacers, small bones, large muscles and great endurance.

"Farmers in Coventry rode to Boston, 72 miles in one day and back the next. There was quite a business there, (Coventry) in raising horses for the West Indies trade. Every farmer of means kept five to ten horses, small boned, active, good under the saddle, mostly pacers and amblers. Then the raising of horses declined and mules were raised instead. Then the western states supplied the mule market at lower prices and that business ceased. About that time the merino sheep business came in."

Beef and Pork. At the beginning of the century Gov. Trumbull refers to the raising of beef and pork as a leading industry in the State.

Much was packed for sale in foreign parts and for years there was a good domestic demand for beef. In Litchfield County droves of two-year-olds were brought from Vermont and New York, fed during the winter on grain and roughage, finished off on pasture during the summer and sold in the fall. The same thing was done in other parts of the State. Devons, Short Horns and Herefords were common, but since 1840 to 1850 the number both of oxen and swine reported in the Census has shrunk though swine have increased in the last twenty years, but to only about half the number reported in 1840.

The introduction of dressed beef and pork by rail from the west has put an end to any very considerable beef production in this State.

Dairying and Dairy Stock. The original or so-called "native" stock of Connecticut undoubtedly came from Devonshire and the adjoining Counties of Somersetshire and Gloucestershire where the Devon breed prevailed and where had been the home of many of the New England settlers. This stock has been called mongrel or inferior by some writers. But any inferiority was probably due rather to the inferior shelter, pasture and feed, and lack of the chance to improve by breeding in the new country than to anything inherent in the animals themselves. "The Commons, the Greens, the Parks, so frequently found in our towns and cities, are landmarks of those early times when each man's cows were gathered into a common herd for better care and protection." (Holt).

The "Town" bull, "Town" herdsman and a "Town" brand also testify to the care of the community for the

individual owner of cows, as well as the constant mixture of good and poor strains.

Meadows and pastures first had some intelligent care with the opening of the new century. A writer in 1813 says: "The introduction of clover . . . has within the last ten years made a very sensible improvement in the agriculture of this country. Indeed it is only within the last twenty years that any grass seed has been sown, and it will be no exaggeration to say that more clover seed has been put in within the last eight years than has ever been since the country was inhabited."

It is true that there was little, if any thoroughbred stock in Connecticut until near the middle of the century, but on the other hand the stock brought over by immigrants would naturally have been as carefully selected as was possible and the records of butter and cheese made and sold in the early part of the century indicate that there were many "good milkers"—as is always the case—among these "native" cattle.

In 1819 the first full-blood Devon bull was imported and in 1820 two full-blood heifers by S. and L. Hurlburt of Winchester Center, (who were the originators, I believe, of the Hurlburt apple). From this stock the first working cattle came which commanded high prices.

The Hurlburt's raised and sold 1,500 of them. At the Hartford fair in 1825 the Hurlburts showed some fine Devonshire bulls and Ayrshire and Holderness steers and heifers. In a report of the Hartford fair it is said that "probably no section of our country can produce a finer race of native cattle than this County. Most of the foreign breeds of known and established excellence are now propagated within the limits of this Society, half blooded Holderness, Ayrshire and Devonshire cows took prem-

iums." The first pure herd book, of which I find notice, is of short horn cattle, begun in 1835 at East Windsor. The early importations of Jersey cattle are most difficult to trace. The animals were called indifferently Jerseys, Guernseys or Alderneys and they were interbred indiscriminately. The marked differences between Guernsey and Jersey today are largely changes which have developed by careful selection and breeding since 1870.

It is stated, (41, Vol. IV), that "nearly, if not quite the earliest importation of Jersey cows into Connecticut was in 1846 when J. A. Taintor brought into Hartford County twelve of the best cows that he could find on the Island of Jersey." The earliest imported Jerseys to become registered later were brought over in 1850 by Messrs. Buell and Norton to Connecticut. Somewhat later C. R. Alsop imported two Jerseys which he sold to Lyman A. Mills of Middlefield in 1869 and which appear in Vol. I of the Jersey Register. He continued as a breeder of Jerseys until 1896 when he sold his herd of 32 head to C. I. Hood of the Hood farm.

Says a recent writer: "When the "Great West" first began to make itself vocal in Jersey Club affairs, there were more Jerseys in Connecticut than in all the great west."

The first Guernseys, the records of which were kept so that they could be recorded in the registry, were imported in 1830 or 1831 by Mr. Prince of Boston. About 1874 a number of importations of Guernseys into Connecticut were made by C. M. Beach of West Hartford, which were the foundation of the herd of E. Norton of Farmington, who was the secretary of the Guernsey registry. The Guernsey herd book was established in Farmington.

The first thoroughbred herd of Holstein-Friesian stock was imported into this country about 1860 when W. W. Chenery of Belmont, Mass., imported a bull and four cows which founded the breed in this country. One of the earliest importers into this State was M. L. Stoddard of Newington. From him A. B. Pierpont of Waterbury bought a bull which, with other pure bloods, founded a fine thoroughbred herd. As this breed is distinctly high milk-producing it has become very popular since fresh milk rather than butter has become the chief product of dairy farms. A total of 7,757 Holsteins have been imported, most of them between 1879 and 1890 and from them our present thoroughbred stock has descended. The number of registered Holsteins in the country in 1915 was 92,048.

The first blooded Ayrshires brought to the United States, came to Connecticut in 1822. In 1837 the Massachusetts Society for promoting Agriculture established its first herd of Ayrshires.

Flint states (27), that "in the opinion of many good judges the dairy stock of New England has not been improved in its intrinsic good qualities during the last thirty or forty years. Cows of the very highest order as milkers were as frequently met with, they say, in 1825 as at the present, 1858."

The general conditions seem to have been these. Early in the century English cattle were imported, Durhams, Devons, Aberdeens, Herefords and Shorthorns and later, when dairy products, rather than beef and draft cattle became necessary, came Ayrshires, Jerseys, Guernseys and later Holsteins. But these were used at first chiefly for "breeding up" the dairy stock with little attention to establishing thoroughbred herds. Phelps says (53),

Shorthorns and Devonshires, prior to 1870 were leading breeds (in Litchfield County) "but when dairying as a business came in, Connecticut became the home of some of the best old world breeds.

In fact there was no science of breeding until Darwin laid the foundations in his series of books on biology, beginning in 1859.

Cheese Manufacture. In 1792 Alexander Norton of Goshen, being sent to the South for his health, bought cheese to sell again at the South. The venture was so successful that he continued the business, packing it first in hogsheads, but later in round boxes which he devised, each carrying two cheeses. This was the beginning of an important cheese making industry in this section. In 1845 Litchfield County made more than 2¾ million pounds of cheese annually, and Windham County 850,000 pounds. Dwight says, (24, Vol. II), "The inhabitants of Goshen are probably more wealthy than any other collection of farmers in New England equally numerous. The quantity of cheese made by them is estimated at 400,000 pounds. This place seems to have been a pioneer in the cheese manufacture on a large scale and no other place in the State did more than a very limited business in cheese making."

The first pineapple cheese was made by Lewis M. Norton of Goshen in 1808 and in 1810 a patent was obtained for the form. He continued till 1844 making cheese from his own herd of fifty cows. He then began buying curd from other dairies and built what is believed to be the first cheese factory in the country. Other factories soon started. Norton's son established one in New York State. The two made 65,000 to 70,000 pounds as late as 1889.

Large herds of Durhams and Ayrshires developed in connection with the cheese industry.

Up to 1780 making butter and cheese at home were the chief branches of dairy industry and cheese formed a considerable part of dairy production till near the close of the century, in places remote from railroad transportation.

From Connecticut the cheese industry and dairy farming in general was carried to the West. "The Connecticut Yankee brought a cheese hoop with him and wherever he went made cheese. Western Reserve has continued to be the dairy section of the State. There the old home made cheese trade developed, there the cheese factory had its beginnings, there the creamery had its development, and there is now the market milk center of the State."

Butter Making, Co-operative Creameries. Butter was made in families from the beginning and home-made butter became an article of trade as soon as the market permitted. Thus in 1845 Litchfield County made 1,290,000 pounds, Hartford and Fairfield Counties almost as much. As the trade increased and uniformity and excellence of quality became more necessary, there developed the creamery system and especially the co-operative creamery.

The Farmington Creamery, if not the very first, established, was certainly the one which incited the general movement. This was organized as a joint stock company in 1869-1870 with a capital of $4,000, afterwards increased to $4,500. In 1871 it received milk from 200 cows and in 1881 from 750. In 1889 there were five joint stock companies and two private creameries within a few miles of Farmington and sixty-three in the State. Wapping Creamery was organized in 1883, Windsor in 1885.

In 1889 Lebanon Creamery "sent tons of home-made butter to Providence," but this became unprofitable and a co-operative creamery was established to make cheese. But all the other creameries, it is believed, were engaged solely in making and marketing butter, the skim-milk being either returned to the farms or in many cases poured into the river.

The advent of the cream gathering system with deep setting left the skimmed milk on the farm, paying by the "space" of cream was supplanted by testing each patron's cream and basing payment on pounds of butter fat delivered. The use of the separator on the farm added to the economy of butter production. But the business of these creameries became unprofitable and they disappeared as rapidly as they had grown in numbers and importance. The reason is obvious. Prior to about 1878 the consumption of fresh milk in cities and towns was light and was supplied within a short radius of farms. At least the demand for fresh milk did not anywhere meet the supply. The surplus was used for butter making in the family, and sold to individuals or to the village store.

Then came the co-operative creamery as has been noted and an increasing demand for high-grade butter. But soon came the ruinous western competition in butter and the introduction of butter substitutes, which closed the butter factories of Connecticut. (In 1889 there were 63 of them, now only very few remain.)

The industry in condensed milk in this country began in Litchfield County. A Mr. Gale of Burrville put up milk under the first patent for condensing milk and employing sugar in the process. The Borden Condensed Milk Company, organized in 1863, did business in Winsted until 1866.

But with the concentration of population in cities and with increased attention to sanitation and the importance of rational nutrition there has come a greatly increased demand for clean fresh milk made under sanitary conditions, and since 1900 about three-fourths of the milk produced has been sold fresh. The production and proper marketing of such milk is now the only profitable branch of dairy industry. Shipping stations for fresh milk have taken the place of creameries, and while very little fresh milk is brought into Connecticut approximately twenty-five million quarts are yearly shipped from Connecticut to neighboring states.

Milk has also been made a safer food by pasteurization, seventy per cent of the fluid milk consumed in the State being treated in this way.

Better still is the production of certified milk from tested cows, with all sanitary precautions in the handling of the milk under rigid inspection by state officials.

The manufacture of ice cream, a recent but rapidly growing business (there are at least twenty factories of good repute in the State), is of great advantage to the dairy business by taking up its surplus milk in periods of over-production.

The number of milk cows in the State, over 85,000 in 1850, was nearly 128,000 in 1890 to 1900, but in 1920 sharply declined to 112,600, due to reduction of stock during the war, but rose in 1923 to 141,000.

Four inventions have made the present development of the milk business possible. The silo is the first, which gives a supply of green, succulent feed through the entire year and greatly reduces the need of pasture land. The practice of ensilaging green fodder is very ancient, but its general introduction into dairy practice is very modern.

In 1870 Goffert published in France a Manual of the Cutture and Siloing of Maize and other green crops, which brought it to general attention and he may be called the Father of Modern Silage. The earliest silos in the United States were built by Miles in Michigan in 1875 and by F. Morris in Maryland in 1876. Their use in this State immediately followed. The round silo resulted from the work of King in Wisconsin, 1892-1895. In 1882 there were less than 100 silos in the United States. It is estimated that now there are a quarter of a million in use.

The second, and later invention is the milking machine which has greatly reduced the labor requirement.

The third is the corn harvester which harvests and binds the crop, ready to be cut and put into the silo by machinery with a further reduction of labor.

The fourth invention is the Babcock test to determine the amount of butter fat in milk as a basis of payment, or as a check on adulteration.

In 1891 this was first used in the State to fix the payment for milk by its content of butter fat. Soon after, it was adopted by the creameries as a basis of payment, replacing other systems which gave a chance for dishonesty and discouraged the producers of high quality cream. At present it is useful as a test of the quality of market milk in the State and as a help to breeders in judging of the performance of individual cows.

The two most insidious and dangerous diseases of dairy stock are tuberculosis and infectious abortion. The danger to the public and loss to the farmer caused by tuberculosis is well understood, but infectious abortion causes more loss to the dairyman than is generally known.

The means of preventing it are now being studied at the Storrs Agricultural Station with encouraging results.

Good progress is now made in ridding the State of tuberculous cattle and of stopping their entry into it.

As a result of the work of the commissioner of domestic animals, the dairy commissioner and federal officials there are now 1,405 herds, containing 31,764 dairy cattle in the State proved to be free from tuberculosis. Of these 410 herds, numbering 8,797 head have been found free for two years or more. This of course, is only a small fraction of the total number of cows in the State, but it marks the early stages of a movement to entirely wipe out bovine tuberculosis and by so doing to lessen the disease in the human race.

The Sheep Industry. In the nineteenth century Connecticut developed an extensive sheep industry, brought into the State and country the merino sheep which were the foundation of the best flocks everywhere, and finally has seen the steady decline of sheep raising almost to the vanishing point.

The introduction of Spanish merino sheep is of special interest because it was the work of a Connecticut citizen and Connecticut was the center from which this breed was distributed, being the foundation of the improved Vermont merinos and the American merinos which have been of inestimable value to the country.

It is said that two merino ewes and a ram were sent to a gentleman in Cambridge in 1798, which were butchered and eaten. In 1801 a merino ram, Dom Pedro, reached this country and was used as a sire in New York and Delaware. In 1801 Seth Adams imported a merino ram and ewe and received a prize from the Massachusetts Agricultural Society for the importation of a pair of superior breed, But for the establishment of the breed

on American farms the country is indebted to Gen. David Humphreys, diplomatist, poet and farmer. In a discourse delivered in 1816, he indulges the hope that "this acquisition of the golden fleece is an event of some importance" and that "it will possibly be remembered when I shall be no more." He was awarded a gold medal by the Massachusetts Society for Promoting Agriculture and later Connecticut gave him a testimonial in recognition of his services.

In 1802, (54), Gen. David Humphrey, U. S. Minister at Madrid, retired from office with the close of the Adams administration. He had become a special favorite among the grandees from some of whom he had acquired a deep interest in the Spanish sheep. Being contrary to American custom he could not accept the present usually bestowed on a departing minister but at his suggestion he was tacitly permitted to send a flock of pure blooded merinos to his farm at Derby, Conn. This consisted of 75 ewes and 25 rams, nine animals having died on the voyage.

His farm at once became the center of the wool growing interest.

At first farmers were not greatly interested, but when America was shut off from foreign wool the interest in wool increased. In 1806 Humphrey was glad to get $300 for a ram and two ewes. In 1808 he sold a ram for $1,000. Crossing merinos with common sheep was found to double the shearing of wool. Connecticut became the center of a sheep mania and in 1813 there were estimated to be 400,000 sheep within the State. From there the merino stock was distributed through the sheep raising sections of the country.

In 1810 merino wool sold in Hartford at the following

prices: Full-bred, $2.75 per pound. Half-bred, $1.00. Quarter-bred, 62 cents.

Regarding the yield per head little data appears. The fleece of a pure merino lamb in New Milford, (1810) was said to weight nine pounds, the carcass, sixty-three pounds.

In 1824 the Saxon merinos were brought in and largely raised.

About 1815 the tariff on wool was removed and a decline in the sheep industry followed, lasting till 1825. Then for twenty years the production of fine wool greatly increased.

In 1840 there were over 400,000 sheep in Connecticut (U. S. Census) and a production of nearly 900,000 pounds of wool. The production steadily decreased from that date until, in 1920 there were less than 12,000 sheep in the State with a wool production of about 42,000 pounds.

In 1810 and 1811, while Spain was at war with Napoleon, her flocks were broken up, eaten by ravaging armies, stolen by the French and thousands were smuggled through Portugal to England. The Junta, in order to get funds, sold the choicest stock and it is estimated that 20,000 full blooded sheep came to America. Most of them probably were used for grading up native stock rather than for building pure blooded flocks. The prices here fell to one-tenth of the prices charged at the height of the excitement following their introduction.

Carding machines for this fine wool were soon found in every hamlet and Congress increased the *ad valorem* duty on wool from five to thirty-five per cent.

Fruit Growing. While the fruit crop was considerable at the close of the preceding century, choice varieties were few. Most fruit trees had been raised from seed. The apples were of all colors and flavors, but of these "native" kinds some were choice and have held their place. Thus the Hurlburt, as already noticed, was a Connecticut seedling. It is said that the original Northern Spy in New York came from seed from Salisbury, Conn. Hadwin states that the first variety of apple developed in New England was the Rhode Island Greening in Portsmouth, R. I. The original tree stood near an ancient tavern known, in 1765, as Green's Inn, and for years its fruit was called "Green's Inn apple."

The Roxbury Russet probably originated in Roxbury, Mass., soon after the settlement of the country. The first settlers at Stonington came from Roxbury in 1649 and it is said brought this variety with them. It is undoubtedly the oldest of native sorts. The original Baldwin stood in Wilmington, Mass., and was first recognized as a favorite fruit about the middle of the eighteenth century.

In the early part of the century, James Hillhouse of New Haven, (44, Vol. I), received scions from the King's gardener in France and grafted 150 varieties of apples and 40 of pears. President Dwight of Yale College, early in the century, (24) gives a list of twenty leading varieties of apples grown in New England, from which fruit may be had in every month of the year except July. Gold states that in the early part of the century Pearmain and Seeknofurther were common and that the Baldwin came into general use later.

At the beginning of the century the apple product was mainly consumed as cider. Soon after, and perhaps in

consequence of the closing of trade with the West Indies which stopped the importation of rum, the manufacture of cider brandy developed rapidly. Many farmers in Hartford County made 300 to 600 barrels of cider and some few 1,000 barrels yearly, eight to ten barrels making one of brandy.

There followed a temperance revival which in a few years arrested this manufacture. Many cut down their orchards and all neglected them.

The more careful selection and improvement of varieties of apples probably began about 1835 to 1840. In 1842 Titus Gaylord of Cheshire had an orchard of 250 trees of "engrafted" winter apples. Since that time the planting of orchards of carefully selected kinds of apples has developed into a special agricultural industry. The crop seems to have reached a maximum in 1900 with a production of 3,708,900 bushels which fell according to the Census of 1920 to 1,395,100 bushels. The quality of the fruit and the careful grading of it were never so good as today.

The pests which attack orchards are many. The two which have proved most injurious are the coddling moth and the San Jose scale. The former is everywhere present and persistent and must be controlled every year by spraying. The San Jose scale, brought into the state on nursery stock was first found by the botanist of the Agricultural Station in 1885.

It spread rapidly and by 1901 was found in seventy-eight places in the State. Many orchards were ruined, many others seriously damaged and the whole industry threatened with ruin. It was finally controlled by a rigid inspection of nursery stock and by the use of sprays. Parasites also developed which destroyed a great deal of the

scale on neglected wild growth. By 1914 the pest was no longer prevalent but lately there has been a fresh development of it.

Excellent seedling peaches were grown in the State before 1800 and long afterwards. Platt, (18), says that about 1840 peaches were as common about our farms as apples, and seedling trees 90 or 100 years old were reported. Later it was believed that the day of peaches was past for trees lived hardly long enough to give a single crop.

In the Seventies peach growing was at its lowest ebb; yet between 1845 and 1875 there were at least thirty orchards in the State, one in Southington of twenty acres. In 1893 Platt estimated that there were about 160,000 peach trees in the State, about half of them set within the last three years.

Peach "yellows," known as early as 1815, (23, 1845), became very destructive and in 1842, is said to threaten the destruction of all peaches. Complaint is also made of the "curl." Rareripes, Admirables, Royal Kensington and Noblesse are mentioned as popular varieties and probably by that time the peach was somewhat generally grown.

In 1875 J. H. Hale of Glastonbury planted the first commercial peach orchard and introduced and greatly fostered this branch of farming in the State.

In 1878 P. M. Augur of Middlefield planted a second orchard of 1,500 trees, but because of frost injury the first considerable crop of peaches was not gathered until 1887, and from then on the business rapidly increased.

The industry has had very serious setbacks, due to insect and fungus invasions and the vagaries of our winter climate, but partly owing to the fact that the Connecticut peach is at its best when those from other orchards

further south are out of market, the business is fairly successful. The peak production was in 1914-1915, probably 500,000 baskets. Hale states that in 1901 there were less than 100,000 peach trees in Connecticut while ten years later there were three million.

This, however, must have been a peach stampede, like the '49 rush for gold in California, which quickly subsided, leaving dead and neglected orchards.

The perishable small fruits have been grown since the early days of the Colony but only became of commercial importance late in the century when quick transportation and the demands of nearby cities made any considerable production profitable.

Since the passage of the Volstead Act, and in consequence of it, the growing of grapes in this State has increased enormously though there are no statistics to show this expansion.

The Seed-Growing Business. While before the Revolution some garden seeds were imported from London by dealers and ship owners, yet most families saved seed of their own raising for their use. The oldest seed firms were established in Philadelphia, the first being David Landreth, established in 1784.

The Shaker colony in Enfield probably started late in the eighteenth century.

The Shakers prepared for market medicinal herbs and garden seeds and their gardens are said to have been very profitable, because their products were everywhere sought, being esteemed better than any other.

They frequently had large orders from Europe for medicinal herbs.

In two sections where vegetables were grown to some

extent for market the possibility of commercial seed growing was recognized. One of these sections was Wethersfield. As has been noted, Wethersfield had long been a center for onion growing and vegetable gardening. Gradually it became a center for seed production rather than truck farming.

The seed business has continued there strong up to the present, in spite of the great changes in commercial and local conditions.

The first general seed business in Wethersfield is believed to have been started about 1820 by James L. Belden. It proved to be profitable and in 1838 was sold to Franklin G. Comstock and his son William G. Comstock.

Later W. G. Comstock with Henry Ferre founded Comstock, Ferre & Company, incorporated in 1853. For 86 years the business has been carried on under the Comstock name and for at least 104 years there has been the same established business on their property. Other firms were later established all of which had a country-wide reputation. Thomas Griswold & Company, established in 1845; Johnson, Robbins & Company, in 1855; William Meggat, in 1866; and Hart, Welles & Company, in 1894, which was succeeded in 1916 by the Charles C. Hart Seed Company.

William B. Comstock, a strong, aggressive man, built up a fine seed trade in the South, having for a time a branch store in New Orleans and he pushed out on the frontier in the days when St. Louis, Chicago and Minneapolis were the extreme "West," almost in advance of railroads. He seems to have started the commission box business. He devised seed bags, with printed cultural directions and wax seals, the different colors of which represented the year of packing, so that the seeds longest

viable, cucumbers, beets, etc., could be carried for five years and others for shorter periods, depending on the duration of their vitality. Comstock laid out the first route of his seed wagons, up the Connecticut valley to Springfield, Vermont and later they covered New England and parts of Canada and other states. Later he put up seeds for the southern trade, shipped to the principal cities from Washington to New Orleans. This branch of the business was dropped by Comstock, Ferre & Company, in 1888 so as to specialize in wholesale trade, but is still carried on by the Chas. C. Hart Seed Company of Wethersfield, probably the only firm in the State specializing in that line.

Onion growing reached its height in the period from 1860 to 1885 and for some years represented many thousands of dollars in farming operations.

In less than fifty years seed growing has swung across the continent and the Pacific and western states have for years been able to produce for a less price, largely because of cheaper labor and greater yields with less liability of loss from insect pests, storms, etc., and while Wethersfield is still a center of a large seed trade, seed growing has shrunk to a very moderate amount. The secret of the development of an extensive seed business in Wethersfield, as in the Milford and Orange region, lies in the fact that the men engaged in it were first of all extensive vegetable growers who had for years carefully selected types of one or more vegetables to secure purity and quality, which were recognized as superior and were in demand. It was skillful selection and growing, rather than selling, which made the great reputation of the place.

The entire seed trade acknowledges its obligation to these growers.

The foregoing facts are taken from an address to the Wethersfield Business Men's Association in 1916 by Mr. S. F. Willard.

The other seed growing and seed trade center of the State is the region of Milford and Orange and in the town of Westport where onion seed as well as onions were at one time extensively raised.

Seed growing as a business was perhaps practiced here in the Forties.

In 1857 E. B. Clark of Milford, succeeded by the Everett B. Clark Seed Company, began the seed trade industry in that section of the State, and inaugurated the growing of sweet corn seed as a business. S. D. Woodruff of Orange, succeeded by S. D. Woodruff & Sons, were also prominently engaged in both growing and trading in seed.

There followed a great expansion of the business, but since 1880 the business has followed the same course as in Wethersfield, viz., great shrinkage in seed production, while the trade in seeds has increased.

A considerable number of varieties of seeds is still grown in Connecticut, largely in the Milford and Orange districts, several of which are not grown elsewhere of as high quality, namely onions, beets, and sweet corn. The Connecticut sweet corn seed is in demand as "stock" seed from regions in the West and South, where home-grown seed degenerates in a few years and fresh stock must be introduced.

For the two seed trade centers sweet corn seed is grown in various parts of the State and it is in large demand from the canneries of the country for it is a surer crop here than in the canning districts, besides being of superior quality.

Probably 1,200 acres are planted at present to sweet corn for seed, very little to onions and perhaps 75,000 pounds of beet seed of exceptionally fine quality are yearly grown in the State.

Vegetable Growing, a very profitable farming industry in the earlier part of the nineteenth century, did not apparently meet much serious competition from other states until the last quarter of the century. As early as 1847 a small quantity of lettuce, radishes, mint and strawberries were brought to New York from the South, but in the spring of 1885 the first all-rail shipment of Southern garden truck came to New York.

In the Eighties also came the first car loads of oranges from Florida and strawberries in large quantities. At present not only are the more solid fruits and vegetables brought into Connecticut from other states but also the very perishable things, like lettuce, asparagus and spinach from the far south fill our markets at certain seasons.

In spite of outside competition, however, the production and sale of strictly fresh vegetables for our home market, seems likely to be an enduring business.

Potatoes were said to have been raised in the western part of the State in 1802 (58), from seed balls, the second or third year from the ball.

About 1842 (20, III), potatoes were a principal crop in Greenwich. The average yield was 200 bushels per acre and they were shipped to New York. For many years Greenwich sent more potatoes to New York than all the other coast towns of Connecticut and they made Greenwich the richest town in the State in proportion to its population.

The Census of 1840 reports a larger yield of potatoes

than in any decade except 1900 and the production has fallen from about three and a half million bushels in that year to less than half that amount in 1920.

Poor seed and a number of rather obscure plant diseases account in large part for the decline.

ONIONS. These were at first grown wholly as a vegetable and Wethersfield became the center of the business in the eighteenth century.

In 1823 Dwight reports that the growing of onions there is still profitable but not so extensively practiced as earlier because of competition.

Gradually the business shifted to onion seed production as noted elsewhere.

Later onion growing became extensive in the Fairfield region, being specially profitable during the Civil War when the "Southport Globe" was raised and sold for ten dollars a barrel. It was the best keeping variety ever put on the market. Probably 100,000 barrels were raised there in the war time. In 1871, onions are reported as the chief crop in Westport and Southport, yielding an average of 500 bushels per acre and the highest recorded yield, 900 bushels. 300,000 to 500,000 bushels were yearly raised in that town. In 1885, a tract six miles square in Westport grew 80,000 barrels of onions which was only two-thirds of a normal crop.

Soon after, the price of onions fell greatly. The white onion was more in demand and was extensively grown. But the difficulty of keeping them, the prevalence of fungous diseases, labor scarcity and a great rise in real estate values together nearly extinguished the onion growing business.

TOMATOES were scarcely grown in the State until the

second quarter of the nineteenth century. T. S. Gold reports that in 1830 he planted tomatoes in his flower garden in Goshen and got an abundant crop. They were called "love apples" and he was told that "they eat them in France"—no one in Goshen did. They are now very extensively grown in the State, both for marketing and for canning.

Tobacco is the one crop which has shown steadily increased production from the beginning of the century to the present. For the last fifty years at least it has met with serious competition from Florida and Georgia, and from Sumatra (since 1881), but in spite of this it has almost constantly held its place as a superior grade of leaf for cigar wrappers. Its growth, rather general through the State in the earlier years, afterwards became limited to the light, sandy soils of the northern Connecticut valley and to the somewhat stronger soils of the Housatonic valley. On such soils alone can tobacco be grown which has the qualities required by the trade for cigar wrappers or binders; the only uses to which it is adapted. In 1840 the production was 235.8 tons, in 1920 2109.6 tons, a nine-fold increase.

Prior to 1801 not more than ten tons of tobacco were grown in Connecticut yearly, and was mostly shipped to the West Indies in hogsheads. The growers got from $3.00 to $3.33 per hundredweight. This was a narrow, so-called "shoestring" tobacco. About that time plug and twist tobacco were made in East Windsor, (at first by a Mrs. Prout from Virginia), and also cigars, known as "paste" cigars and later as "long nines" or "Windsor particulars." (68, 1856).[23]

[23] Col. Israel Putnam, of Wolf Den fame, is credited with the introduction of cigars into Connecticut. It is said that he went as Lieut. Col. of the

In 1810 factories were established in East Windsor and Suffield which also used both Spanish and Connecticut tobacco in their cigars and peddled them through the country from wagons.

About 1824-1825 a packing house was established and the leaf, in bales of 100 pounds, (another writer says 400 pounds), were enclosed in boards on four sides with the ends exposed.

Till 1833 "shoestring" tobacco was grown. But about this time a broadleaf strain was brought by B. P. Barbour of East Windsor, from Maryland, which was far better suited to cigar manufacture, by its shape, texture and neutral flavor. The somewhat careful sorting of the leaf before sale began about 1840.

The first tobacco was grown in the Housatonic valley, at Kent, in 1845 and soon after in New Milford. By 1870 it became a leading product.

In 1890 tobacco was first grown under shade in this State by the Connecticut Agricultural Station and the station also introduced with it the method for the rapid fermentation of the leaf in bulk instead of in cases. Both practices immediately gained favor and in 1893, 645 acres were grown under shade in the Connecticut valley.

Then, owing to lack of experience in curing and fermentation and the use of unselected "Sumatra" seed, the raising of shade tobacco suffered eclipse and the acreage of the next three years ran from 40 to 70 acres, but rapidly increased with increased skill in raising and handling the crop to 6,100 acres in 1918, the larger part of it

first Connecticut regiment in the expedition against Havana in 1762. Shortly after its capture, while on a scouting expedition, he saw nearly every native smoking a big, roughly rolled cigar. A trial of them so pleased him that he brought home a quantity, "as much as three donkeys could pack". Later he kept a tavern in Pomfret and distributed his cigars which soon became very popular.

in Connecticut. The shaded tobacco under favorable conditions commands a much higher price than that grown in the open. In 1924 the acreage was 5250.

In 1856, (43, Vol. I), an effort was made to induce growers to put their crops in a general warehouse in order to rid themselves of the speculative system of buying and selling.

It was claimed that in the three years during which it had been practiced, on a limited scale, growers had got from 50 to 75 per cent more for their crop than had been obtained from "speculators," and had also raised the speculators' prices. Apparently an organization was effected which continued for some years. How much it actually accomplished or how long a course it ran, does not seem to have been recorded.

In the fall of 1922 The Connecticut Valley Tobacco Association was formed, its members binding themselves for five years to sell to the Association all of the tobacco raised by or for them. It operates 104 warehouses, grades all the tobacco from its members, sells it and as sales are made pays the members according to the grading of their crop, after paying the expenses of the organization. At present it controls 87 per cent of the acreage of New England tobacco which is grown in the open.

Corn. We have seen that maize was the staple crop and staple cereal food of the settlers in the seventeenth century. Gradually wheat displaced it, at first only among the more prosperous in the centers.

But baked in thin cakes, forerunner of the "hoe cake" of the South, cooked as "hasty pudding," with molasses as a sauce, later made into bread with rye ("rye and Injin"), corn meal was widely used in the country in the

eighteenth and early nineteenth centuries, and now, while it has almost passed as a family food, it has not passed from some of us as a not unpleasant boyhood memory.

We have also noticed that corn has become a chief reliance of dairymen to make good the lack of pasturage in summer and to provide a succulent food in the long winters. While the silo did not come into general use before 1880, the value of the corn plant for fodder was understood long before. A writer in the "Connecticut Courant" in 1821 calls attention to corn fodder and claims that, properly cured, it is as good as hay. He cuts it when it is about ready to spindle and cuts it high enough so that it will "spread again" and give a second crop.

The production of the grain increased steadily since 1840 till 1909.

The yield in 1919, 2,062,495 bushels, was 468,000 bushels less than in the preceding census, and may be explained by a poor season and in part by the larger production of wheat after the war. This larger production of shelled corn includes a very considerable amount of sweet corn seed shipped out of the State to canneries and seed dealers.

Rye and Oats. The crop of oats, which in 1840 nearly equalled that of corn, has steadily declined to the present time.

The production of rye, always grown in smaller amount than oats, has likewise steadily declined, though it is still used quite extensively as a cover crop and green manure.

Wheat. Connecticut has never been a considerable grain producing State. Even in the eighteenth century its wheat supply was drawn largely from New York and

Pennsylvania, and after 1850 the "golden West" almost monopolized the business. Yet the State has been slow to quite abandon the growing of wheat. Thus in 1845 a writer in the "Cultivation" says that more or less wheat has been grown on his farm in Cheshire for forty-five years, and the crop was a failure not more than three times in this period. For the fifteen years since he has owned the farm there has been no insect injury. His wheat runs 62 pounds to the bushel.

As late as 1871 wheat growing was not uncommon. Thus 100 acres were grown in Westport, with an average yield of 30 bushels per acre.

Greenwich at the same time reported that the majority of farmers raised enough to supply them with bread.

It is interesting to note that in the financial crash of 1836-37 so wide a ruin of wheat was wrought by the Hessian fly that more than 1,360,000 bushels of wheat were imported into this country from Europe.

From 1850 to 1880 38,000 to 50,000 bushels of wheat were yearly raised in Connecticut. Then the production fell to about 7,000, 9,000 and 12,000 bushels in the three following decades, but rose to 50,000 bushels in 1919, a larger crop than at any time since 1840. This was a war time emergency. Very many farmers raised satisfactory crops of wheat and found that on good land a yield of 40 bushels per acre was quite possible.

With the great increase in poultry keeping, it is not likely that wheat growing will immediately fall to the pre-war basis. It is quite likely that to supply feed for poultry and for dairy stock it may find a place with profit in farm rotations.

HEMP. As has been noted, hemp was grown from the early days, being encouraged by bounties. About 1810 it seems to have been quite successful on the fertile banks of the Connecticut River and on warm uplands.

Long Meadow, just over the Massachusetts line (19. 1810), is stated to have sold the year's crop in Boston, New Haven and New York for $35,000. Three to twelve hundred pounds per acre could be raised, and it was quoted at $412 per ton in Boston, but $200 was a fair price when trade with Russia was open. Dwight says (24, Vol. I). "Hemp has lately excited the attention in earnest. At Long Meadow and at Enfield, Conn., and at some other places in the neighborhood, it grows luxuriantly and is undoubtedly the most profitable crop that can be raised." In 1804 the General Assembly put a bounty of $10 a ton on domestic hemp or flax which was later repealed. But as late as 1829 land on which hemp was raised was exempt from taxation.

Probably the business never attained any great volume. The census of 1860 reports the Connecticut production of hemp as three tons, and it is not reported later.

FLAX was widely grown in this State in the first quarter of the century and in some places in rather large amount, both for the fiber and for the seed. Thus in 1802 Milford raised 100,000 pounds of flax and 4,000 bushels of flax seed. In 1807 (36. II) Fairfield exported about 20,000 bushels of flax seed a year, and later more flax was grown there than in the whole of New England beside (24, III). The average crop of flax was about 200 pounds with 6-8 bushels of seed.

In 1810 (9), while flax in the country exceeded both wool and cotton as textile fibers, it was not suited to New

England conditions because of the labor and fertilization required, but as it was needed for the making of tow cloth and linen, a small area on the farm was generally planted to flax, until about the middle of the century, and by 1880 the growing of flax had practically ceased in this State.

The course of Connecticut farming since about 1880 and its present condition have been admirably set forth by Prof. I. G. Davis of the Connecticut Agricultural College in the "Agricultural College Review," March, 1924.

What follows is chiefly an abstract of his conclusions:

During the last forty years, in the rapid changes in economic conditions, Connecticut agriculture has been forced to continual readjustment to meet these conditions. This has resulted in more intense methods of farming and elimination of the less productive and more remote farm lands.

"Our agriculture of forty years ago was a livestock industry, based on hay and pasture." These are crops requiring a broad acreage. But when the seemingly exhaustless, fertile lands of the West were opened, wool, mutton and beef, easily produced and easily carried or driven to shipping points, was brought to market at prices with which Connecticut farmers, with small fields and brush pastures, could not compete and make a living. So these lines of farming had to be given up, and, as in every other business, changed conditions had to be met by changed methods and changed production.

The extensive production of beef, sheep and dairy manufactures (cheese and butter) was therefore gradually abandoned. But these are hay- and grass-consuming industries requiring extensive acreage, and their abandonment inevitably caused the decrease by more than one-

half in improved farm acreage. The use of motor vehicles for local transportation instead of horses accounts for a further reduction in hay acreage.

What has been the result?

1. The production of livestock products, which are easily transported (meats, wool, butter and low-grade eggs) has rapidly declined, while the production of things which, because of extreme perishability, can be produced only where they can reach the consumer quickly, in perfect condition, has increased. Fresh milk and high-grade eggs, produced for local market, show this decided increase. Dairying does not require extensive pasture land. Grain feeding, the use of soiling crops and the extensive use of corn silage are substitutes for grazing land. The fact that corn is the only food crop which has not declined but actually increased since 1880, is explained by its extensive use in dairy feeding.

2. The growing of cash crops which have a high weight per unit of value, such as hay for sale, potatoes and cabbage, declined during the period.

Low freight rates tended to discourage raising them here, but the higher freight rates now prevailing may bring them in again. There are signs of this revival helped by better methods of production which the Agricultural College is introducing.

3. An advance has been made in raising crops in which we have distinct soil, climatic or seasonal advantages, which enables us to more than meet the quality or prices of our competitors. Such are tobacco, sweet corn (for immediate consumption or for seed), apples, peaches and perhaps tomatoes. Thus the production of tobacco has increased three-fold since 1880. Peach orchards have been almost entirely developed in the last forty years. The

farm apple orchard has been slowly dying, but the business apple orchard, with modern methods of production and marketing, is making sound and consistent progress, and the outlook is very promising.

4. Growing extremely perishable cash crops, in which the marketing expense of competitors is very high, due to distance and perishability, certain vegetables for instance, is increasing. It may be added that the more enlightened taste of consumers will be a help to this industry.

They are learning that slightly wilted vegetables are better fitted for cattle than for the "home circle," and that sweet corn, after twenty-four hours' keeping, may serve for "roughage," but is not a delicacy.

Now, what has been the result as shown by statistics? Does it justify the opinion so often expressed, that Connecticut agriculture is ready to perish, or at least is continuing in a dead-and-alive condition?

Prof. Davis, who has had exceptional opportunity to study the question, makes the following statements:

"Even when all corrections have been made for the fluctuations of the dollar for the past forty years, Connecticut agriculture shows a five-fold increase in the value of its products per acre, and a three-fold increase of the value of the products per farm, and the total value of the products of the State has doubled. Specifically, the increase in the value of the products of the farm since 1880 has been from $10 per acre to $48.60 per acre, and the value of products per farm from $540 to $3,100." [24]

The average Connecticut farm is producing somewhat more than the average in the United States.

Prophecy regarding business ventures is futile. Faith in the future, based on the record of the past, which is

[24] Changed by E. H. J. to prices as per commodity index, (1913-100)

the sentiment of the legend on the seal of this State, is reasonable, and necessary to success.

"There certainly has never been a time within sixty years," says Prof. Davis, "when the opportunity for a man with the right training and character, to farm with the prospect of getting a good income and attaining a high standard of life for himself and his family is as good as it is today."

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